



# Ohio Per- and Polyfluoroalkyl Substances 2019 Sampling Report

**Final**

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**Acronyms and Abbreviations**

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Abt	Abt Associates
Facility	Washington Works Facility in Parkersburg, West Virginia
GenX or HFPO-DA	hexafluoropropylene oxide dimer acid
GPS	global positioning system
HSP	Health and Safety Plan
ID	identification
ND	not detected
NS	no samples collected
ODNR	Ohio Department of Natural Resources
OGPUPS	Oil & Gas Producers Underground Protection Service
OUPS	Ohio Utilities Protection Service
PFAS	per- and polyfluoroalkyl substances
PFCA	perfluoroalkyl carboxylic acid
PFOA	Perfluorooctanoic acid
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure

## 1. Introduction

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Abt Associates (Abt) conducted field sampling in September 2019 to help characterize the spatial extent and degree of per- and polyfluoroalkyl substances (PFAS) contamination in Ohio natural resources related to releases from the Washington Works facility (the Facility), in Parkersburg, West Virginia.

This report provides a summary of the approach for sampling shallow soils, surface water, soil cores, groundwater, drinking water, and biota in Ohio within 40 miles of the Facility; and presents the results from the analyses conducted on these field-collected samples. A description of the study objectives is provided in Section 2, the sampling area and Abt's sampling design and approach for site selection are described in Section 3, environmental sample collection methods are presented in Section 4, and Section 5 provides the laboratory analytical results for the various media. This is followed by references cited in the text.

The report contains multiple appendices with supporting documentation for the field effort. Data tables with analytical data are provided in Appendix A; a scanned copy of all field notes and datasheets are provided in Appendix B; analytical laboratory reports are provided in Appendix C; the data validation report is in Appendix D; photographs of each sampling site are provided in Appendix E; soil boring logs are provided in Appendix F; the full electronic data package, electronic data deliverables (EDDs), and validation reports are provided electronically as part of Appendix G; photographs from the sampling trip are provided electronically in Appendix H; and a separate relational Access database that contains the field and analytical data is provided electronically as part of Appendix I.

## 2. Study Objectives

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For the 2019 sampling effort, we collected samples to address three main objectives, which are discussed in Sections 1.1–1.3 below. Overall this sampling effort was meant to augment previously available data (including Abt's 2018 field sampling study; Abt Associates, 2019a) to further characterize the spatial extent and degree of perfluorooctanoic acid (PFOA), hexafluoropropylene oxide dimer acid (HFPO-DA, also known as GenX), and other PFAS contamination in southeast Ohio within 40 miles of the Facility in Parkersburg, West Virginia.

### 2.1 Objective 1: Further Characterize Spatial Extent of PFAS Contamination in Ohio

The overall goal of Objective 1 was to further characterize (relative to existing data) the extent of PFOA and other PFAS contamination in Ohio related to releases from the Facility. To address this objective, we collected shallow soil and surface water samples along State Routes and county roads up to 40 miles from the Facility. We chose to sample within the right-of-way along roads because they are publically accessible areas found throughout our study area. In addition, we collected shallow soil, surface water, and drinking water samples from State lands 20–40 miles from the Facility; these only included State lands that were not sampled during the 2018 sampling effort (Abt Associates, 2019a).

## 2.2 Objective 2: Evaluate Relationship between PFOA Concentrations in Shallow Soil and Groundwater

The overall goal of Objective 2 was to evaluate the relationship between shallow soil PFOA concentrations and underlying groundwater concentrations. To address Objective 2, we collected shallow soil samples along State Routes and county roads from sites that are near private well locations (i.e., within a mile radius of the well) for which existing PFOA groundwater concentration data are available. This sampling provides shallow soil data that are proximate to groundwater data collected from private wells by E.I. du Pont de Nemours & Co. (DuPont) and/or The Chemours Company (Chemours).

## 2.3 Objective 3: Further Characterize PFAS Contamination within Ohio State Lands

Objective 3 includes two sub-objectives: (1) further characterize the spatial extent and degree of shallow soil PFAS contamination on State lands, and (2) evaluate how PFOA and other PFAS contaminants are distributed across different environmental media and resources (e.g., groundwater, surface water, drinking water, biota).

For the first sub-objective, we conducted additional shallow soil and surface water sampling with higher spatial resolution, compared to our 2018 study, to better characterize the contamination in six select State lands.

For the second sub-objective, we collected a soil profile and a co-located groundwater sample (beneath the profile) at up to two locations in four of the select State lands (i.e., Veto Lake Wildlife Area, Shade River State Forest, Forked Run State Park, and Strouds Run State Park). In addition, we collected drinking water samples from Forked Run State Park, Strouds Run State Park, and Burr Oak State Park. At Forked Run State Park, we also collected plant samples and co-located shallow soil samples from three locations. The overall goal of the second sub-objective was to sample a greater diversity of environmental media from State lands to help inform a conceptual site model that could be used to assess exposure and inform possible restoration activities.

More specific details on sample numbers and locations for each objective are discussed below.

## 3. Sampling Approach

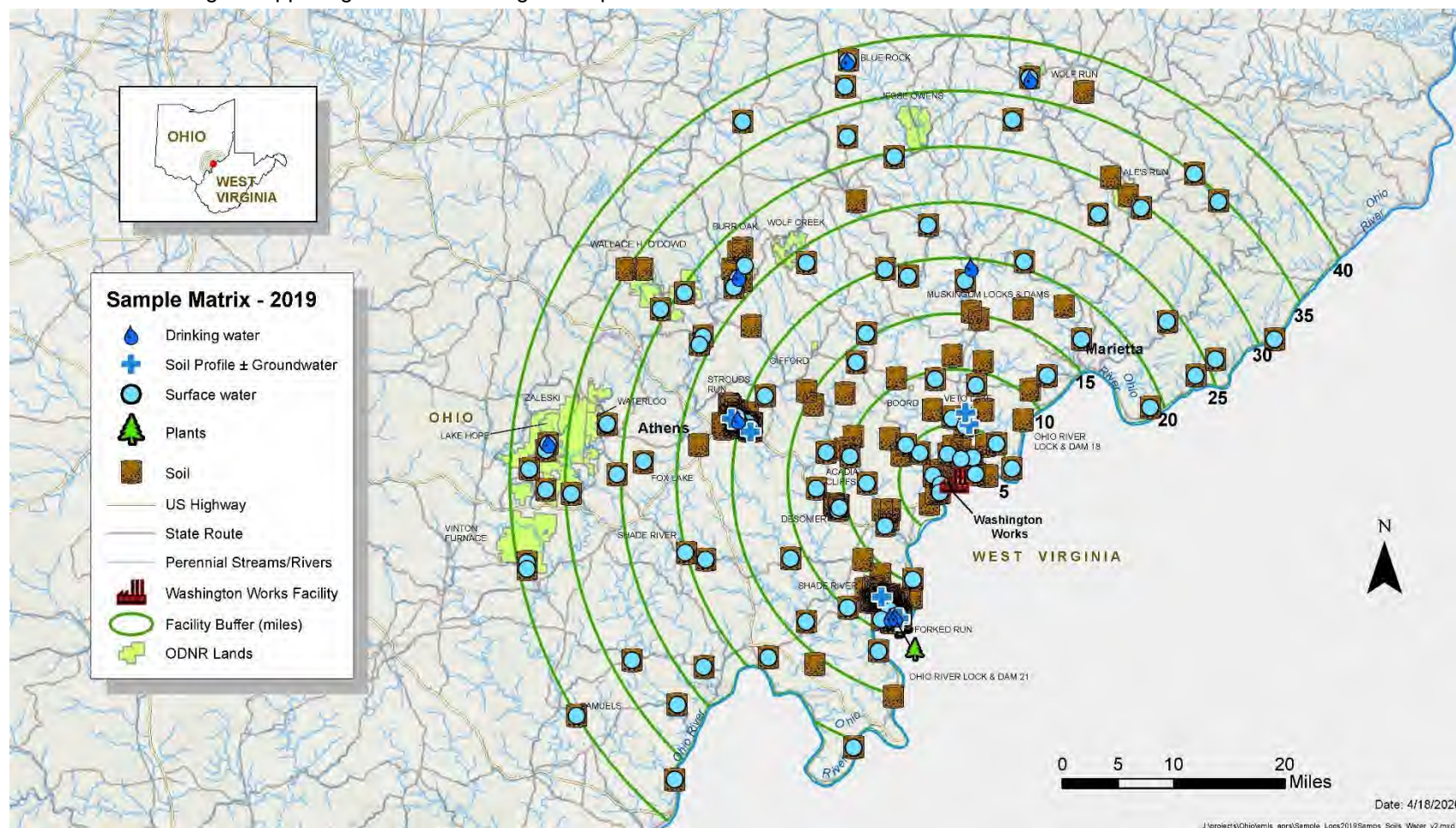
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In this section we provide our sampling approach for this September 2019 field sampling effort, including a description of the study area, and our approach for selecting sampling sites and sampling locations within the study area. Sampling was conducted in accordance with the Sampling and Analysis Plan (SAP; Abt Associates, 2019b), which provides a Quality Assurance Project Plan (QAPP), a Health and Safety Plan (HSP), Standard Operating Procedures (SOPs), and permits obtained for this field effort.

This sampling effort included 67 roadside sampling locations, 32 of which were in close proximity to private wells sampled previously for PFOA as part of a DuPont/Chemours monitoring program. In addition, we collected samples from 18 State lands. Overall, we collected a total of 387 environmental samples inclusive of all media (Figure 1). We also collected field quality control (QC) samples, including field duplicates and field blanks. Table 1 provides the sample numbers by type for each sampling objective. In Sections 3.1–3.3 below, we further describe the sampling conducted under each objective.



**Figure 1. Map of samples by matrix collected in 2019.** The concentric rings show the distance from the Facility, with the miles for each interval shown along the upper right side of the rings. Sample matrix icons are not to scale.



**Table 1. Sample numbers by type for each sampling objective.** Sample numbers include field duplicates.

Objective	Shallow soil	Surface water	Deep soil <sup>a</sup>	Groundwater	Drinking water <sup>b</sup>	Plant tissue	Plant rinsate
Objective 1							
Roadside	69	64	NS	NS	NS	NS	NS
State lands	19	15	NS	NS	4	NS	NS
Objective 2							
Near private well	35	NS	NS	NS	NS	NS	NS
Objective 3							
Veto Lake Wildlife Area	5	7	7 (2)	1	NS	NS	NS
Desonier State Nature Preserve	6	5	NS	NS	NS	NS	NS
Shade River State Forest	33	4	2 (1)	NS	NS	NS	NS
Forked Run State Park	21	4	6 (2)	3	2	14	7
Strouds Run State Park	28	7	6 (2)	2	2	NS	NS
Burr Oak State Park	5	3	NS	NS	1	NS	NS
<b>Total</b>	<b>221</b>	<b>109</b>	<b>21 (7)</b>	<b>6</b>	<b>9</b>	<b>14</b>	<b>7</b>

a. Number of samples only includes deeper soil samples. Shallowest soil sample from each soil profile is included under the shallow soil column. Number of vertical soil profiles is shown in parentheses.

b. For Objective 1, drinking water samples were collected from Muskingum River State Park Lock 4, Lake Hope State Park, Wolf Run State Park, and Blue Rock State Park.

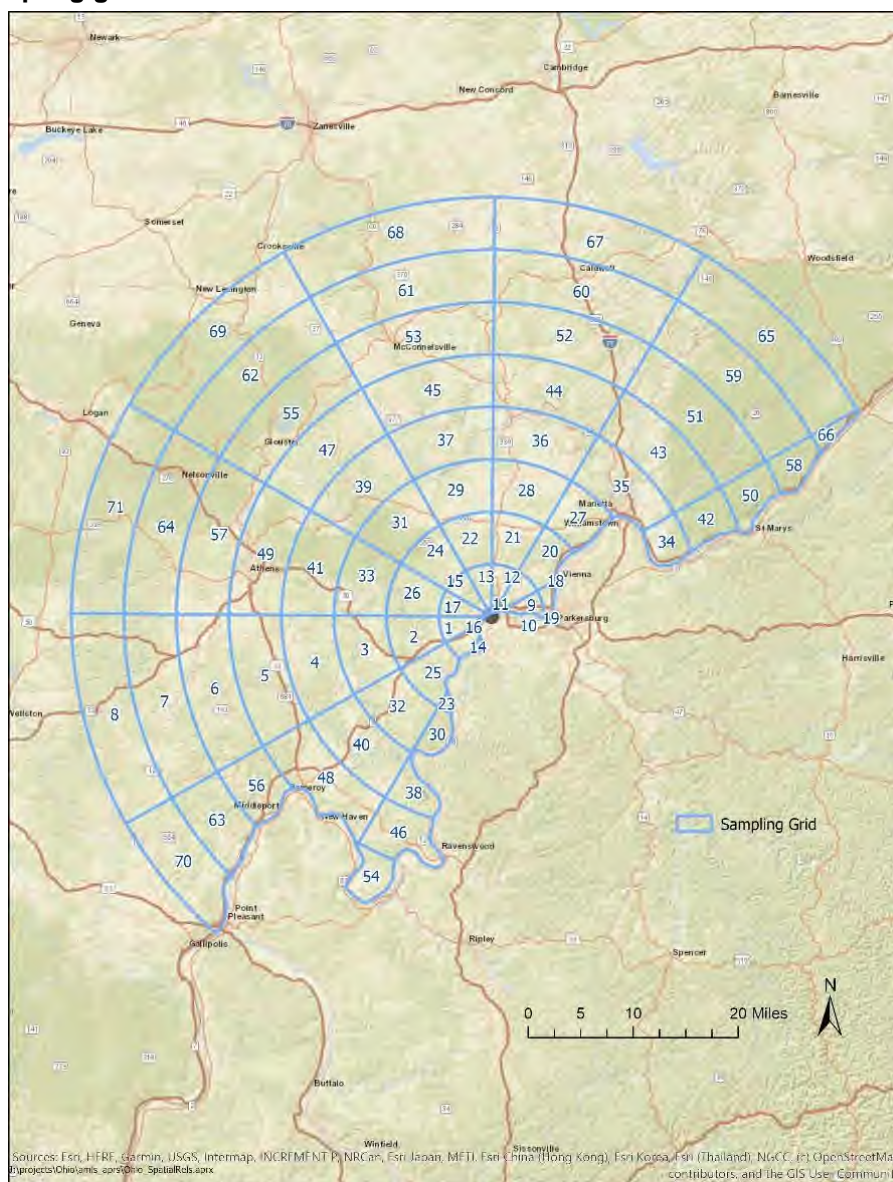
NS = No samples collected.

### 3.1 Objective 1 Approach – Further Characterize Spatial Extent of PFAS Contamination in Ohio

For the first objective, our study area was defined as the area within a 40-mile radius of the Facility in the State of Ohio. Within the study area, we created a sampling grid by dividing the semi-circular area radially into nine slices (including whole and partial slices), and then dividing these radial slices into grids using circular Facility buffer lines set at five-mile intervals from the Facility (see Figure 2). This divided the study area into 71 grid cells. Grid cells 10, 14, 19, and 66 were small, and thus we did not include them in our sampling plan. The remaining 67 grid cells were sampled.

To select a sampling site within each grid cell, we identified all sites where Ohio State Routes intersect a waterbody (i.e., bridge crossings). These sites are at locations where we could collect a shallow soil sample and a co-located surface water sample within the right-of-way of the Ohio State Route. We then randomly ordered all the identified sampling sites within our study area and selected the sampling site with the lowest randomized number in each grid cell. For those grid cells without a suitable sampling site along two-lane State Routes, we identified sampling sites along county roads, randomized those sites, and again used the lowest randomized number to select a sampling site. For Ohio, the right-of-way is defined as 30 feet from the road center line, which is approximately 20 feet from the edge of a typical two-lane road.



**Figure 2. Sampling grids.**

For Objective 1, we also collected samples from Ohio State lands 20–40 miles from the Facility (see Figure 1). A list of all State lands sampled in 2019 is provided in Table 2. In general, these areas represent State lands that are located within the study area and were not sampled during the 2018 sampling trip (Abt Associates, 2019a). If there was a major waterbody, such as a lake, reservoir, or perennial stream, within the State land, our sampling targeted a site where we could collect a surface water sample from the waterbody. Otherwise, we randomly selected a sampling site within the State land by dividing all publically accessible roads within the State land into 10-m segments, assigning a randomize number to each segment, and selecting the segment with the lowest random number as our sample location. In some cases where a State land crossed more than one grid cell, we collected more than one sample from that State land within different grid cells.

**Table 2. State lands sampled in 2019**

Objective	State land	Number samples collected (all media)	Distance from Facility (range of sample distances in miles)	Land area (acres) <sup>a</sup>
1	Muskingum River State Park Lock 4	1	19	21
1	Muskingum River State Park Lock 6	2	20	3
1	Muskingum River State Park Lock 7	1	26	13
1	Wolf Creek Wildlife Area	2	24	3,978
1	Fox Lake Wildlife Area	3	28	450
1	Wallace H. O'Dowd Wildlife Area	4	30–35	3,331
1	Ale's Run Wildlife Area	2	30	2,783
1	Waterloo Wildlife Area	4	32	2,659
1	Zaleski State Forest	6	34	28,629
1	Wolf Run State Park	3	37	1,372
1	Lake Hope State Park	3	37	2,621
1	Blue Rock State Park	3	39	301
1	Vinton Furnace State Forest	2	39	12,331
1	Samuels Wildlife Area	2	40	84
3	Veto Lake Wildlife Area	13	5–6	363
3	Desonier State Nature Preserve	11	10–11	496
3	Shade River State Forest	37	11–13	3,043
3	Forked Run State Park	30	13–14	848
3	Strouds Run State Park	39	19–22	2,575
3	Burr Oak State Park	9	26–28	3,278

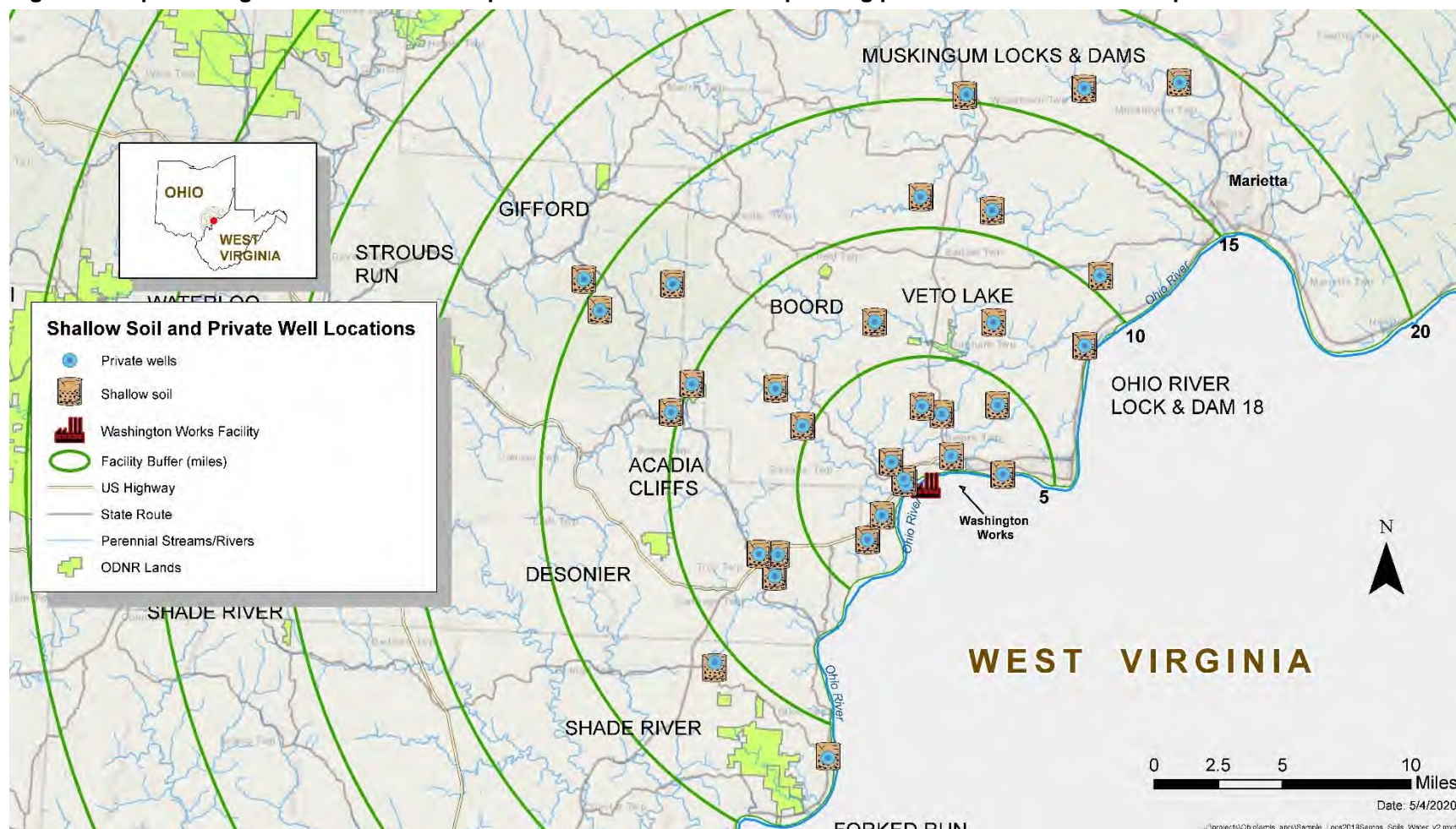
a. Land areas were determined using the Ohio Department of Natural Resources (ODNR) Lands shapefile downloaded from the ODNR Geographic Information Systems website (<http://geospatial.ohiodnr.gov/data-metadata/search-by-category>).

### 3.2 Objective 2 Approach – Evaluate Relationship between PFOA Concentrations in Shallow Soil and Groundwater

For Objective 2, we collected shallow soil samples from along State Routes or county roads in proximity to properties with private drinking water wells that have been sampled by DuPont/Chemours as part of a PFAS drinking water monitoring program. We ensured adequate spatial distribution of these co-located soil samples by identifying one previously sampled private well within each grid cell (Figure 2). If more than one private well fell within a grid cell, we selected the well with the highest measured PFOA concentration. We then located the closest State Route or county road to the selected well. If there was not a State Route or county road within one mile of the private well location, we proceeded to the well with the next highest PFOA concentration in the grid cell. Through this process we identified 27 sampling sites. We then selected additional wells from the remaining previously sampled private wells to increase sample numbers for Objective 2. We chose these additional wells from grid cells that had the largest number of private wells. We targeted wells with higher PFOA concentrations that were not immediately adjacent to a well already selected for sampling. In total we collected 32 shallow soil samples as part of Objective 2. These sites are shown in Figure 3.



Figure 3. Map showing locations of selected private wells and the corresponding proximate shallow soil samples.



### 3.3 Objective 3 Approach – Further Characterize PFAS Contamination within Ohio State Lands

We identified five Ohio State lands on which to conduct more comprehensive spatial sampling at increasing distance from the Facility (Veto Lake Wildlife Area, Desonier State Nature Preserve, Shade River State Forest, Forked Run State Park, and Strouds Run State Park; Table 1). These five areas represented the five largest State lands within 20 miles of the Facility. In addition, we conducted a more limited sampling effort at Burr Oak State Park (Table 1). We collected shallow soil and surface water samples from all six State lands. We also collected drinking water, vertical soil profiles, and samples of underlying groundwater using direct-push technology (Geoprobe®); and plant tissue and rinsate samples (canopy study) from a subset of these six properties (Table 1).

#### 3.3.1 Shallow Soil Sampling Locations

We selected locations for shallow soil sampling within each of the State lands using a systematic random sampling (i.e., gridded) approach. To ensure access, our sampling locations were limited to areas that were accessible from either a road or a walking trail. We applied a grid with 50-acre grid cells over the entire property for each State land and identified the grid cells that contained walking trails or roads. For those grid cells with intersecting trails or roads, we divided the trail or road into 10-m sections, randomly numbered the 10-m sections, and then selected the lowest numbered section in each cell as our sampling site for that grid. In cases where there were more grid cells with sampling sites than the total number of samples we had targeted for a particular property (based on a frequency of 1 site per 100 acres of land), we randomly ordered all the cells with sampling sites, and selected the desired number of sampling sites, starting with the lowest random numbers assigned to these cells. For each grid cell, we established secondary sampling sites using the next lowest random numbered segment. Secondary sampling sites were used if the primary site was not accessible. This process and the final set of sampling sites are described in detail in the SAP (Abt Associates, 2019b).

We collected five shallow soil samples at Burr Oak State Park. To select these five sampling sites, we divided the park into four quadrants, and then conducted a similar randomization exercise as described above, for each of four quadrants, selecting the lowest random number to be the sampling site. We then selected the second-lowest random number from the quadrant with the most sampling sites as a fifth sampling location (Abt Associates, 2019b).

The shallow soil sampling locations in these six State lands are shown on Figures 4–8.

#### 3.3.2 Surface Water Sampling Locations

For surface waters, we selected sites within each State land by targeting major waterbodies such as lakes, reservoirs, perennial streams, and major lake or reservoir inlets and outlets. The sites were selected to allow us to determine PFAS concentrations in these major waterbodies and, in some cases, the surrounding watershed. Locations of the surface water samples are shown in Figures 4–8.



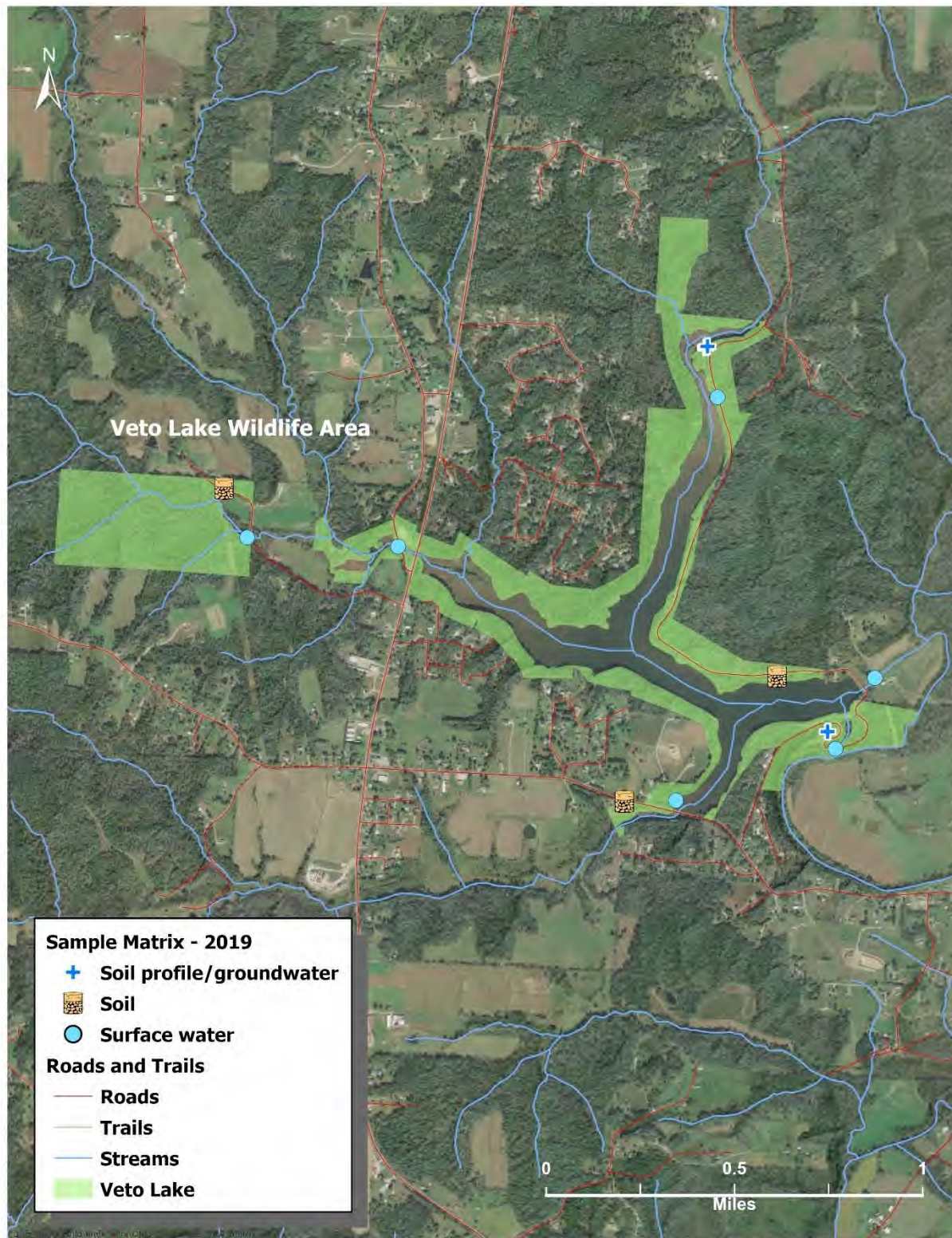
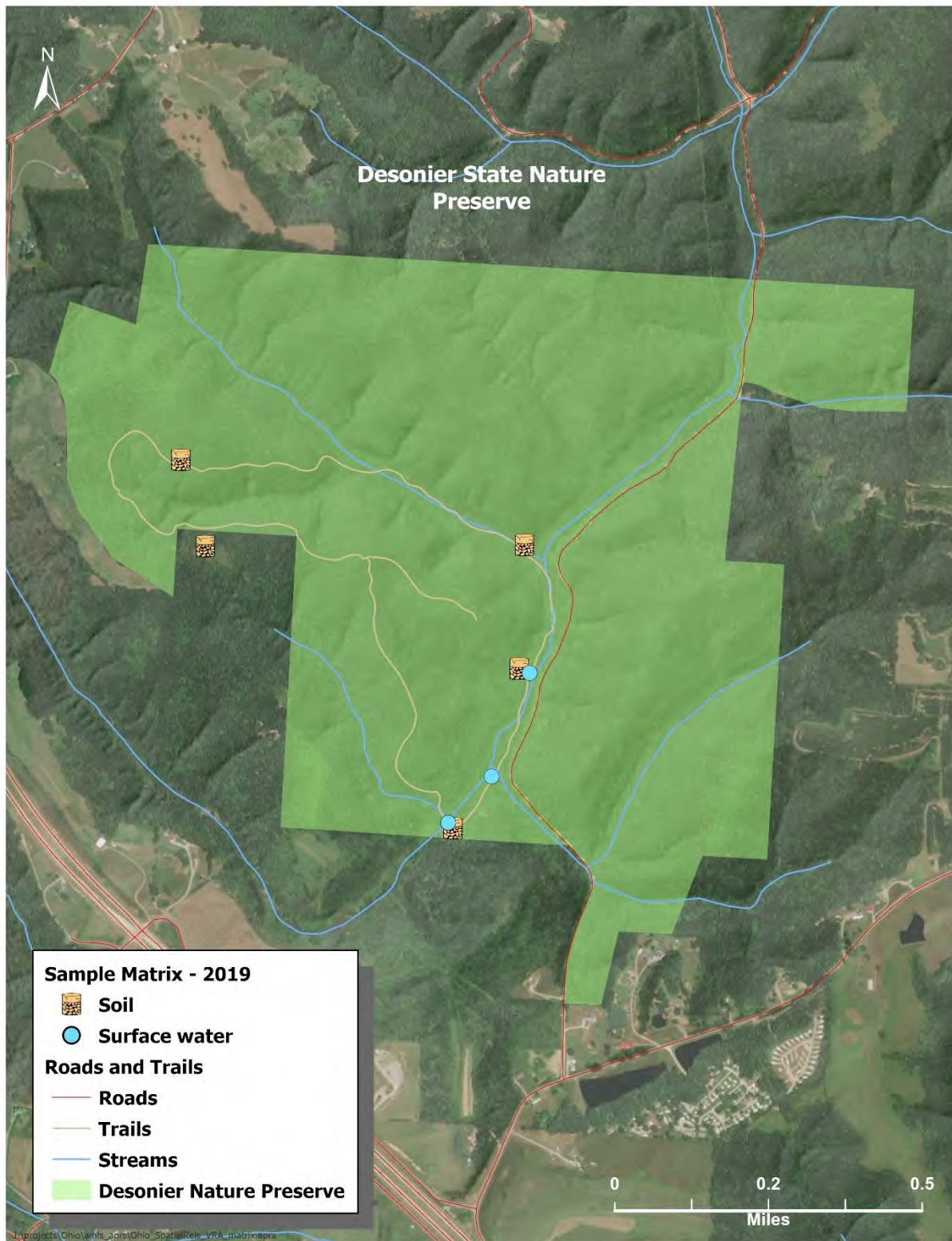
**Figure 4. Sampling locations for all media types in Veto Lake Wildlife Area.**

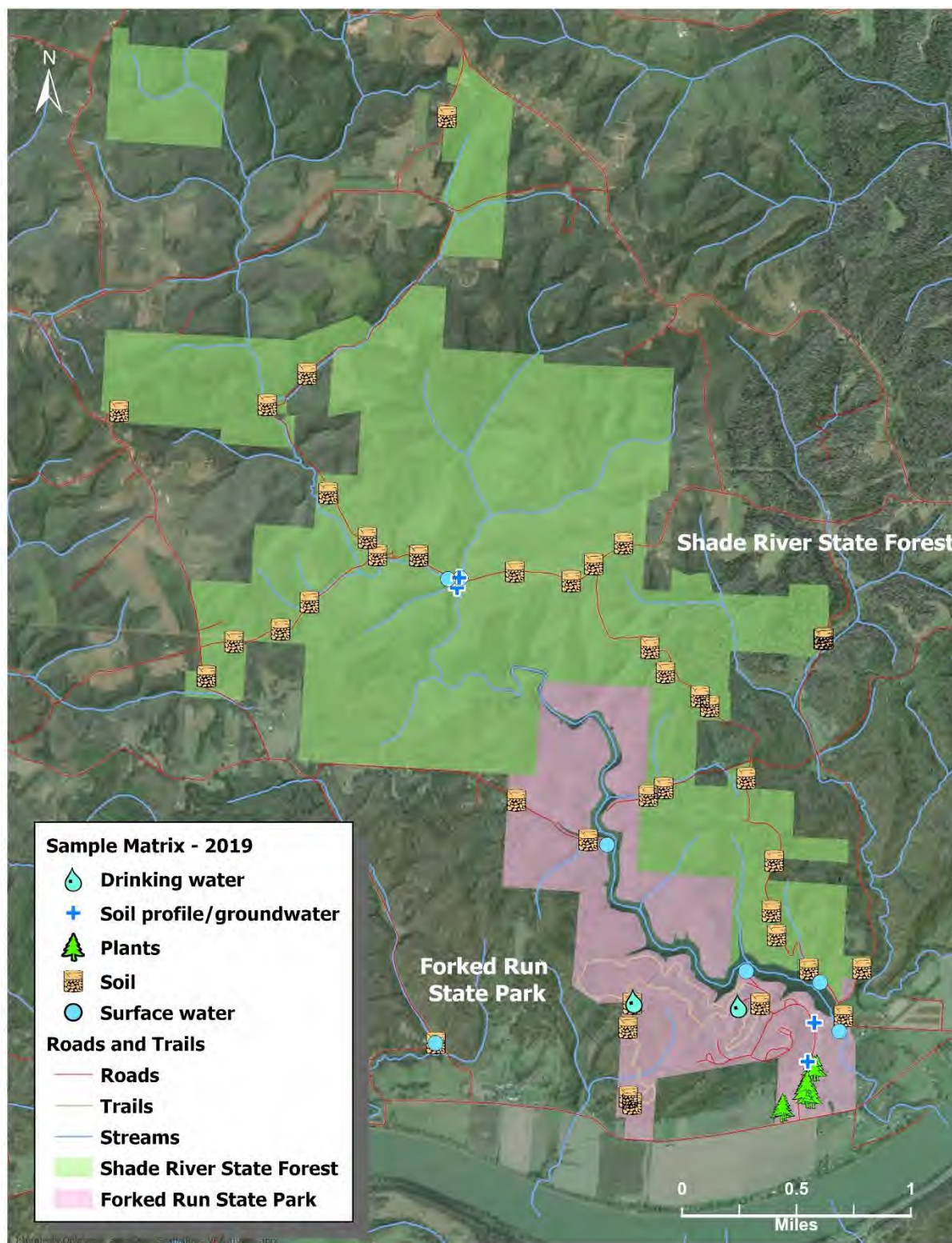


Figure 5. Sampling locations for all media types in Desonier State Nature Preserve.





**Figure 6. Sampling locations for all media types in Shade River State Forest and Forked Run State Park.**





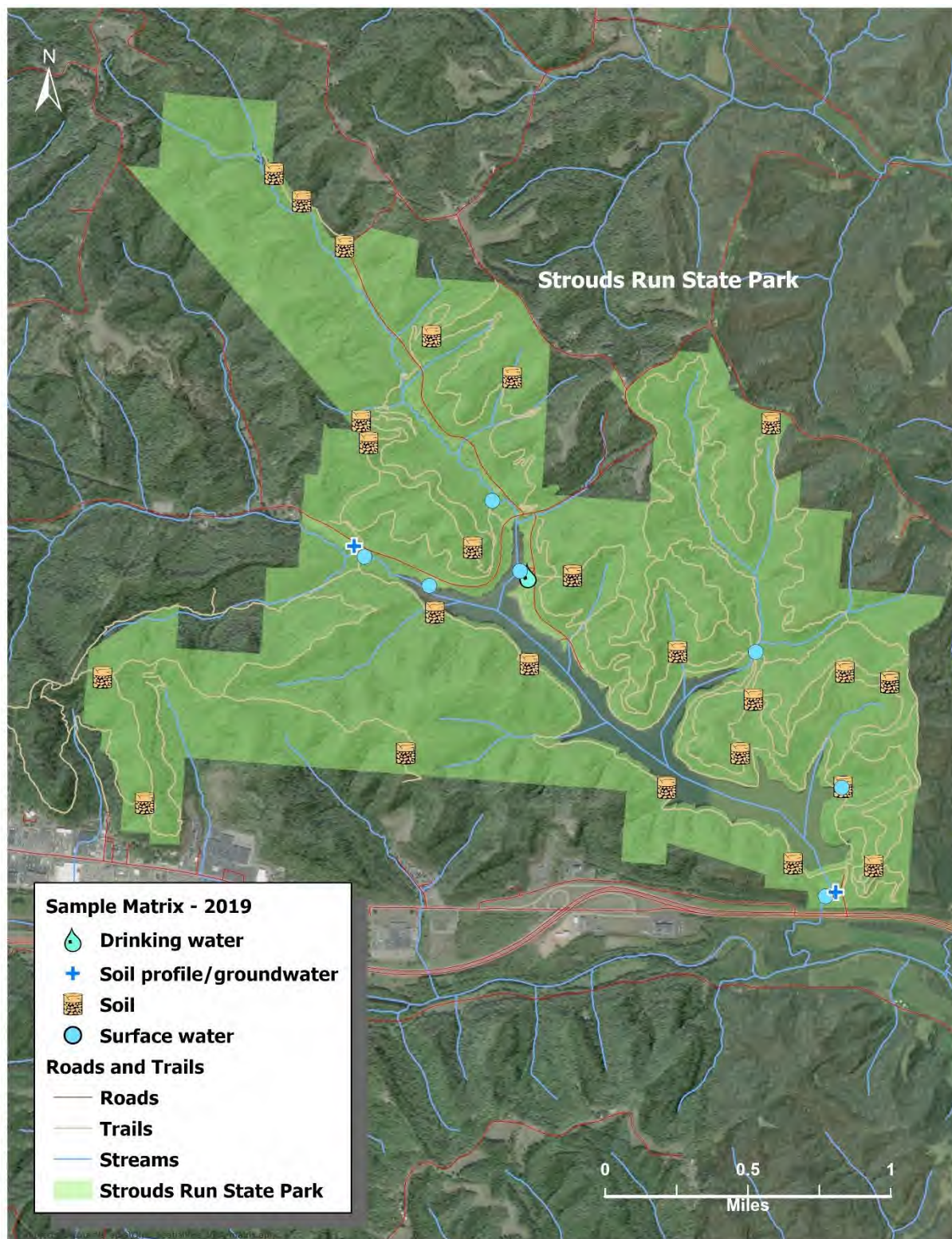
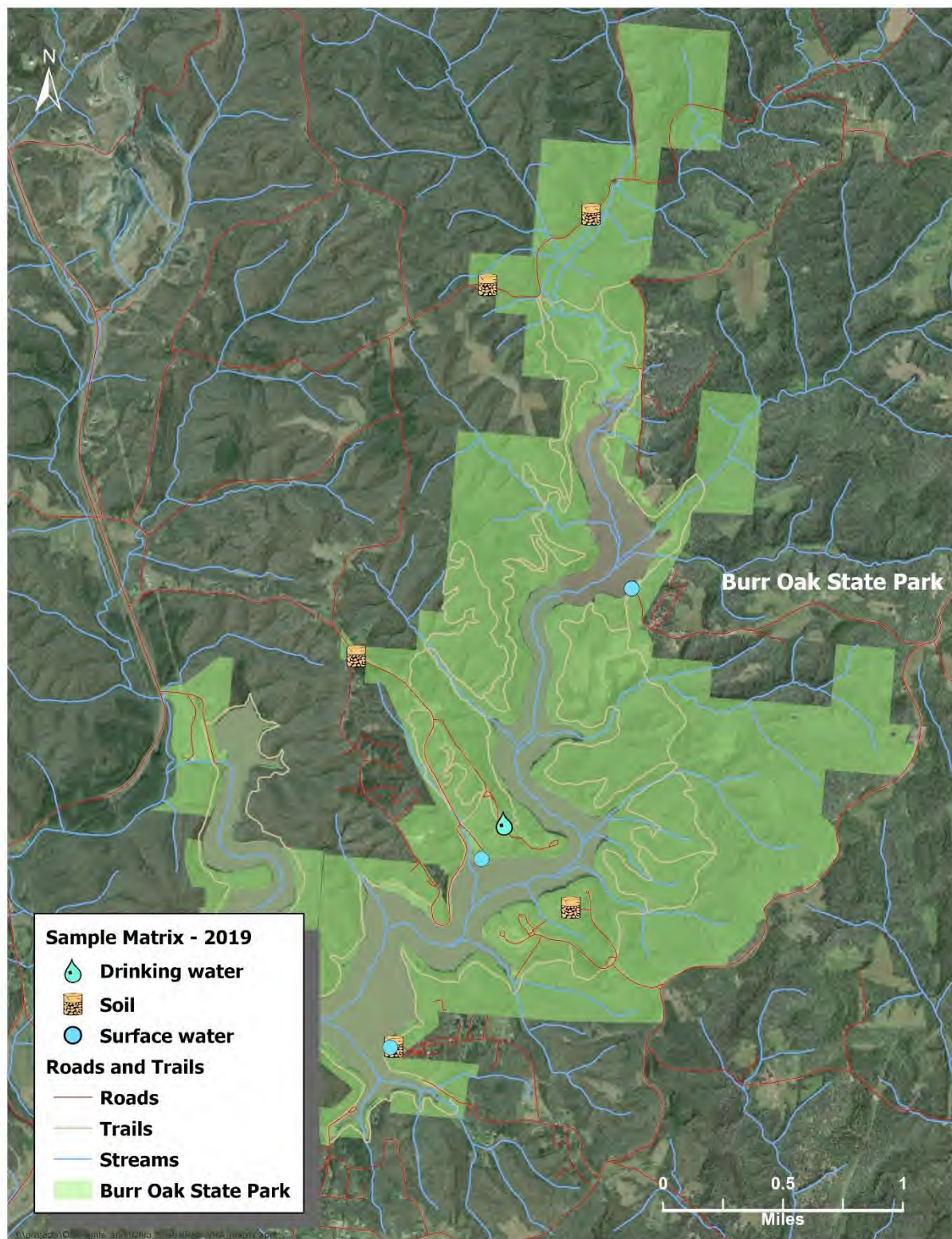
**Figure 7. Sampling locations for all media types in Strouds Run State Park.**



Figure 8. Sampling locations for all media types in Burr Oak State Park.



### 3.3.3 Soil Profile, Drinking Water, and Plant Tissue Sampling Locations

In addition to shallow soil and surface water samples, from four of the six State lands we collected vertical soil profiles using Geoprobe® direct-push technology and then, if possible, collected an underlying groundwater sample (Table 1). For these sites, we selected locations that were near water and appeared accessible for the Geoprobe® equipment. Also, if drinking water was available at the State land, we collected a drinking water sample (Table 1). Finally, we conducted a small canopy study at Forked Run State Park, in which shallow soil, plant tissue, and plant tissue rinsate samples were collected at three locations (see Section 4.6). The sampling locations for these additional samples are shown in Figures 4–8.

## 4. Sampling Methods

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The following sections describe the methods we used to collect shallow soil, surface water, vertical soil profiles, groundwater, drinking water, and plant samples for this study. Detailed methods for sample collection and documentation are provided in the SAP (Abt Associates, 2019b). Students and staff from the University of North Texas assisted Abt field team leaders with sampling. Sampling using the Geoprobe® was done by Envirocore, Inc. under the supervision of an Abt team leader.

### 4.1 Site Characterization

Sampling sites were characterized using photographs according to the guidelines in the SAP (Abt Associates, 2019b). Photographic documentation of a site included first photographing the location's coordinates displayed on the global positioning system (GPS) unit, and then photographing the selected sampling location to capture relevant features at the site. In some cases, field teams produced hand-drawn habitat maps to document notable habitat features in the sampling area relative to the sampling location. Site identification (ID), GPS coordinates, photograph information, and other observations were recorded on the appropriate datasheets.

### 4.2 Shallow Soil Collection

Along State Routes and within State lands, field teams collected shallow soil samples, targeting a depth of 6 inches. At these sites, samples were collected using small plastic scoops according to the SAP (Abt Associates, 2019b). All soil sampling occurred at locations with proper permissions from the Ohio Utilities Protection Service (OUPS) and the Oil & Gas Producers Underground Protection Service (OGPUPS). Field duplicate QC samples were collected at a minimum frequency of 1 in every 20 sampling locations. We used new, dedicated equipment for all soil sampling, and therefore equipment rinsate QC samples were not needed. All soil samples were placed into a container with wet ice until shipment to the laboratory for PFAS analysis.

### 4.3 Surface Water Collection for Field Parameter and Chemical Analysis

Surface water samples were collected from selected lakes, reservoirs, streams, and rivers within the study area using a simple grab sample method (see Abt Associates, 2019b). Before the collection of surface water samples, we measured water quality parameters (i.e., pH, specific conductance, water temperature) and recorded other habitat characteristics such as water clarity/turbidity, substrate type, approximate width of the stream, approximate water column depth, stream flow characterization (riffle, run, pool, etc.), nature of the stream banks (rip-rap, vegetation, eroded, etc.), presence of biota, and any other pertinent observations.

Field duplicate QC samples were collected at a minimum frequency of 1 in every 20 sampling locations. Water samples were collected directly into the sample bottle. It was not necessary for any of the sampling teams to use a secondary container to collect surface water samples, and therefore we did not need to collect equipment rinsate blanks. After collection, all water samples were placed into a container with wet ice until shipment to the laboratory for analysis.

#### 4.4 Soil Profile and Groundwater Sample Collection

We collected up to two soil profiles and, when possible, underlying groundwater samples at four of our selected State lands: (1) Veto Lake Wildlife Area, (2) Shade River State Forest, (3) Forked Run State Park, and (4) Strouds Run State Park. At each site, we collected a vertical soil core from the ground surface to the water table using Geoprobe® direct-push technology. From each soil core, we collected up to five soil samples according to the SAP (Abt Associates, 2019b). We refer to this set of soil samples as a vertical soil profile. Following extraction of a soil core, a temporary well point was installed, and a groundwater sample was collected by peristaltic pump according to the SAP. At two locations, the Geoprobe® met refusal as a result of encountering shallow bedrock, and we were unable to advance the probe to the water table to collect a groundwater sample. In each of these cases, we collected a surface water sample in the immediate vicinity of the soil profile.

We collected a set of soil field duplicate QC samples and a groundwater field duplicate from one site according to the SAP (Abt Associates, 2019b). For any equipment in direct contact with the samples, we used new, dedicated equipment that was discarded after use. All samples were placed into a cooler with wet ice until shipment to the laboratory for analysis.

#### 4.5 Drinking Water Sample Collection

Using resource descriptions and State land maps provided on the ODNR website, we identified State lands within our overall sampling area that provide drinking water. For the State lands we visited for shallow soil and surface water sampling under Objectives 1 and 3, we also collected one or more drinking water samples according to the SAP (Abt Associates, 2019b) if a drinking water source was available. For all drinking water samples we tested for the presence of chlorine using a chlorine test kit.

Field duplicate QC samples were collected at a minimum frequency of 1 in every 20 sampling locations according to the SAP (Abt Associates, 2019b). All drinking water samples were collected directly into sample bottles; therefore, no equipment rinsates were needed. After collection, water samples were placed into a cooler with wet ice until shipment to the laboratory for analysis.

#### 4.6 Tree Canopy Study

The purpose of this sampling effort was to determine if PFAS concentrations differed in soils located below tree canopies compared to soils collected from adjacent areas that were not below tree canopies. Recent studies have indicated that rain water collected beneath tree canopies contains higher concentrations of PFAS than rain water collected in adjacent open areas that are not directly below tree canopies (North Carolina Department of Environmental Quality, 2018). The mechanism behind this phenomenon is still being determined but it may be due to the atmospheric deposition of airborne PFAS particles on tree leaves that are then rinsed off by rain.



water, which could result in elevated PFAS concentrations in the underlying soils. This area of southeastern Ohio is heavily forested and PFAS (PFOA and GenX) were or are likely currently being released into the atmosphere via dryer stacks at the Facility.

To explore the relationship between PFAS concentrations and tree canopy, we collected plant samples and co-located shallow soil samples from three replicate areas near the entrance to Forked Run State Park (Figure 9A). At each of the three sampling areas, we collected tree canopy samples, including deciduous leaves from maple trees (*Acer spp.*) and needles from white pine trees (*Pinus strobus*), from one of the three sampling areas. In addition, we collected shallow soil samples from directly below where the tree canopy samples were collected (Figures 10 and 11). Leaf and pine needle samples were collected by hand (with nitrile gloves) and were pulled off of tree limbs that could be reached by standing on the ground (i.e., no ladders were used to reach higher levels in the tree canopy). Shallow soil samples were collected using the same methodology described in Section 4.2. In open areas, we collected grass clippings adjacent to the location where we collected shallow soil samples. Additionally, we collected a shallow soil sample along the edge of the canopy areas where taller vegetation (trees and shrubs) met open grassy area sampling locations (Figures 9B and 11C). The northern- and southern-most sampling areas (S385 and S386) included one deciduous canopy sampling location, and the third sampling area between these two areas (S384) included one deciduous (maple tree) and one coniferous (pine tree) canopy sampling location (Figure 9B).

All plant tissue samples from each location were divided into two equivalent portions, weighed, and stored in zippered plastic bags. We rinsed one of each of the two plant tissue samples with PFAS-free water to simulate rain water rinsing PFAS off of plant tissues. We rinsed plant tissues by pouring 250 mL of PFAS-free water into a zippered plastic bag with the plant tissue, sealed the bag, and gently agitated the bag by hand (slowly rotating the bag in circles) for five minutes. After five minutes the rinsate water was poured out of the bag directly into a labeled water sampling container. All soil, plant tissue, and plant rinsate samples were analyzed for the full PFAS suite.

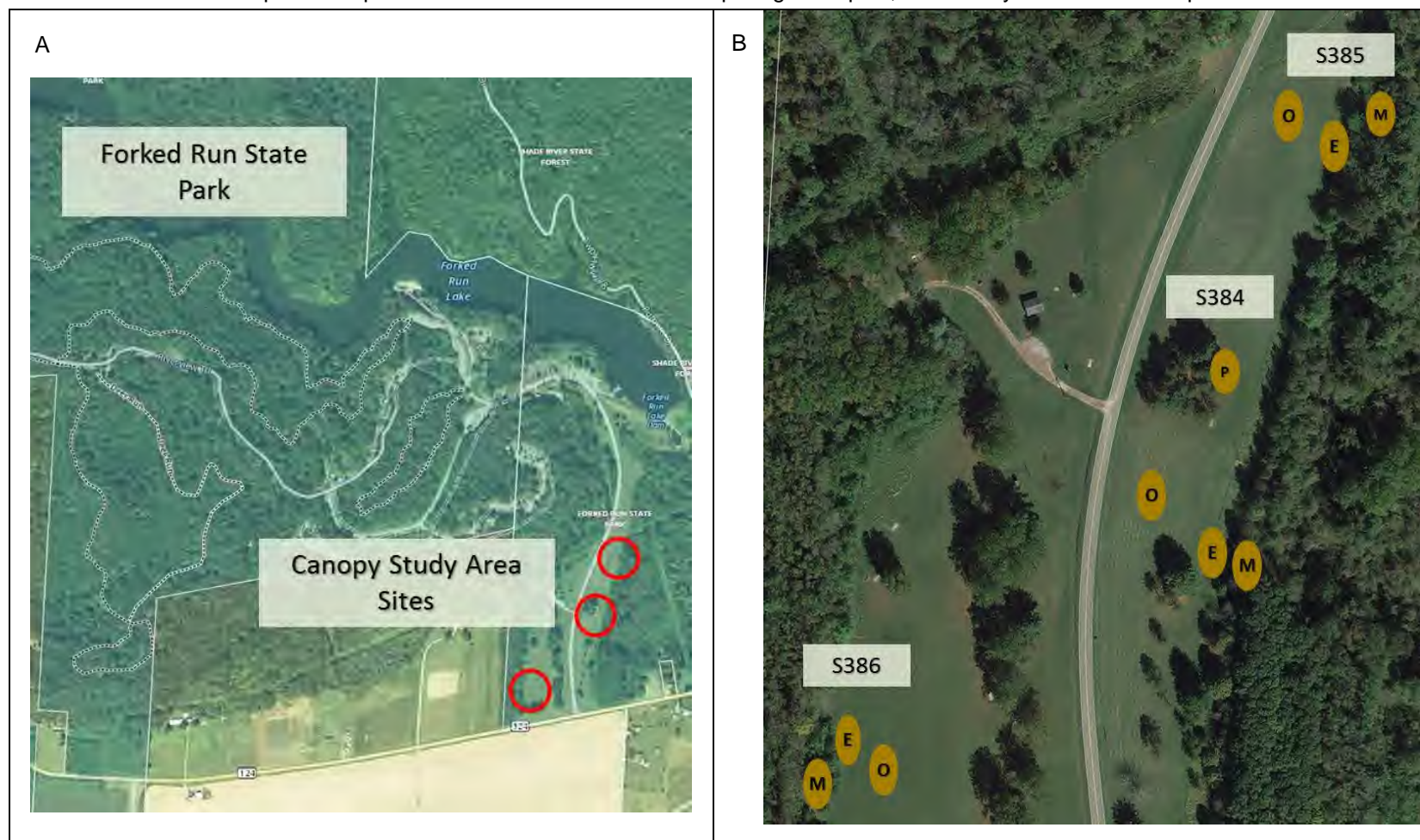
#### 4.7 Analysis of Samples

Abt staff sent field-collected soil, surface water, groundwater, drinking water, plant tissue, and plant rinsate samples under chain-of-custody to Eurofins TestAmerica for sample analysis.

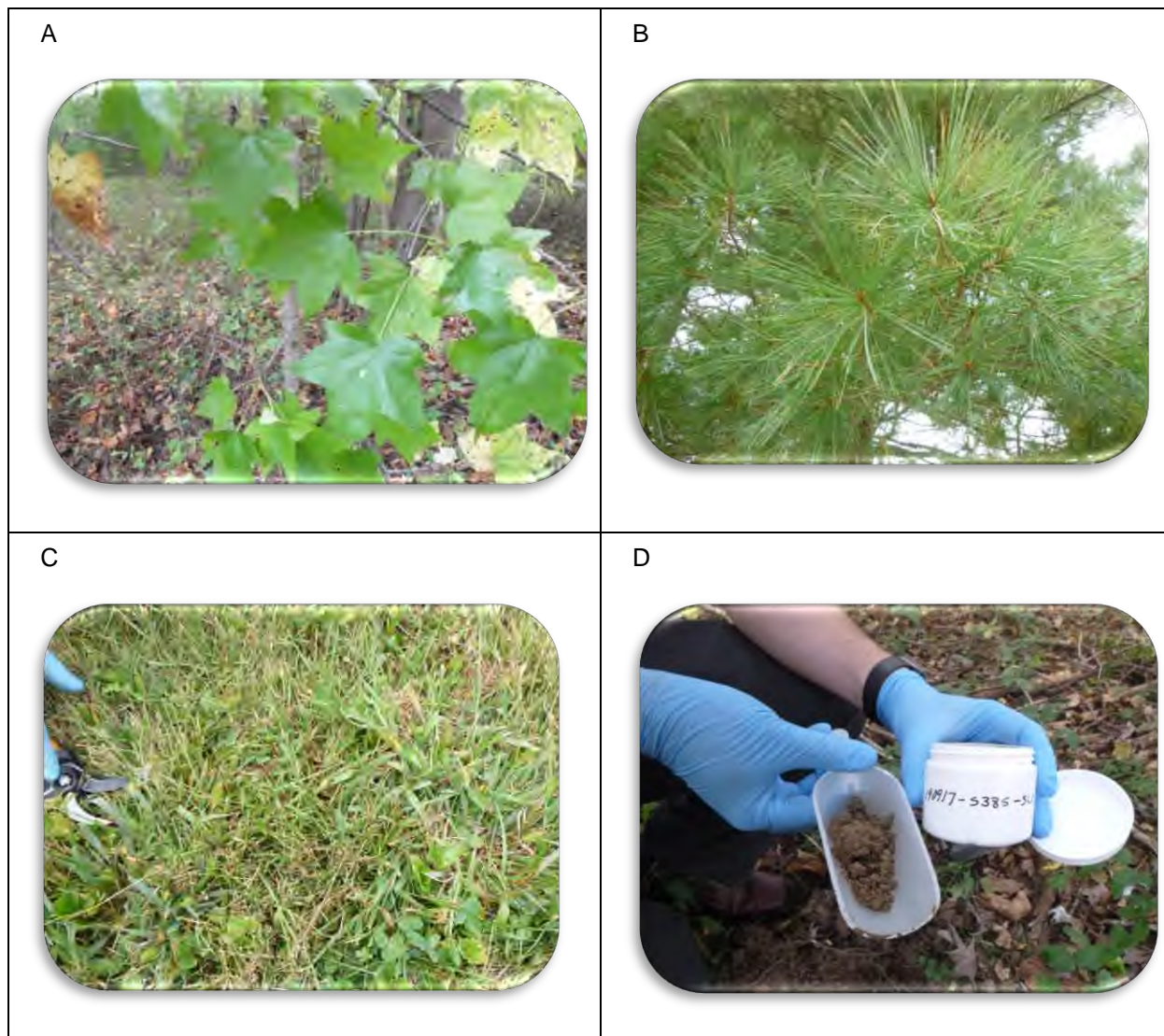
Samples were analyzed by Modified U.S. Environmental Protection Agency Method 537 for a suite of 31 PFAS analytes that included PFOA and GenX (Table 3). In addition to environmental samples, QC samples were collected, including field blanks and field duplicates. All QC samples were collected, as described in the SAP (Abt Associates, 2019b), and analyzed for PFAS.



**Figure 9. Canopy study areas in Forked Run State Park.** The three study areas are indicated with a red circle near the entrance to Forked Run State Park (A). These areas were assigned site IDs S384, S385, and S386 (B). Orange circles indicate locations where samples were collected (B). E = edge areas, M = maple tree canopy areas, O = open areas with no tree canopy, and P = pine tree canopy areas. Shallow soil and plant samples were collected at all sites except edge samples, where only shallow soil samples were collected.

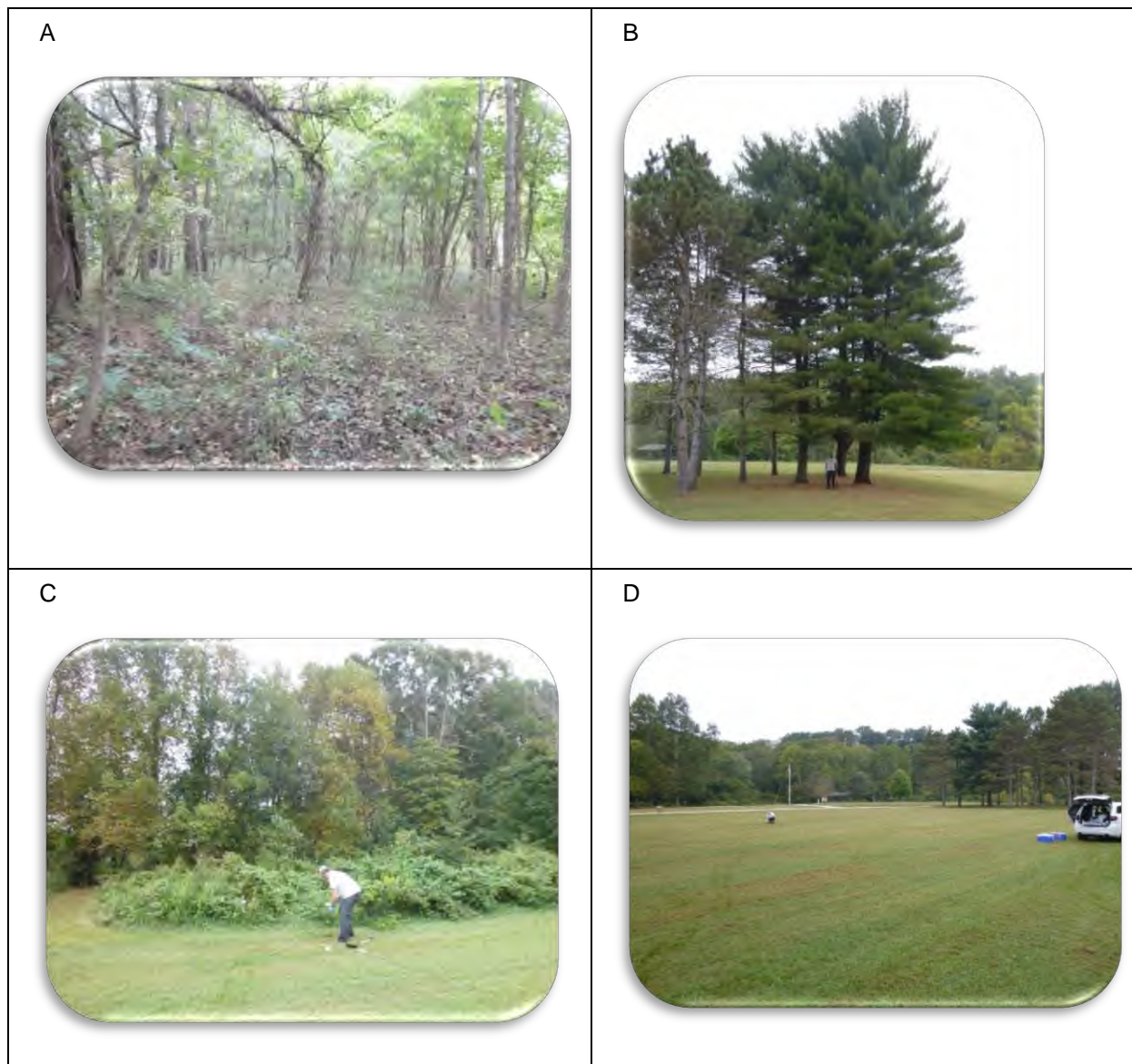


**Figure 10. Photographs of different sampling media in the study areas, including deciduous (maple tree) leaves (A), pine needles (B), mixed grass/turf (C), and shallow soil (D).**





**Figure 11. Photographs of different sampling areas in the study site, including deciduous (maple tree) canopy (A), pine canopy (B), edge (C), and open (D).**



**Table 3. List of PFAS analytes reported by analytical laboratory**

Chemical name	Abbreviation
Perfluorobutanoic acid	PFBA
Perfluoropentanoic acid	PFPeA
Perfluorohexanoic acid	PFHxA
Perfluoroheptanoic acid	PFHpA
Perfluorooctanoic acid	PFOA
Perfluorononanoic acid	PFNA
Perfluorodecanoic acid	PFDA
Perfluoroundecanoic acid	PFUnA
Perfluorododecanoic acid	PFDoA
Perfluorotetradecanoic acid	PFTeA
Perfluorotridecanoic acid	PFTriA
Perfluorobutanesulfonic acid	PFBS
Perfluoropentanesulfonic acid	PFPeS
Perfluorohexanesulfonic acid	PFHxS
Perfluoroheptanesulfonic acid	PFHpS
Perfluorooctanesulfonic acid	PFOS
Perfluorononanesulfonic acid	PFNS
Perfluorodecanesulfonic acid	PFDS
Hexafluoropropylene oxide dimer acid	HPFO-DA or GenX
4:2 Fluorotelomer sulfonic acid	4:2 FTS
6:2 Fluorotelomer sulfonic acid	6:2 FTS
8:2 Fluorotelomer sulfonic acid	8:2 FTS
N-ethylperfluorooctanesulfonamidoacetic acid	NEtFOSAA
N-methylperfluorooctanesulfonamidoacetic acid	NMeFOSAA
Perfluorooctanesulfonamide	FOSA
4,8-dioxa-3H-perfluorononanoic acid	DONA
Sodium 4,8-dioxa-3H-perfluorononanoic acid	NaDONA
Ammonium 4,8-dioxa-3H-perfluorononanoic acid	ADONA
6:2 chlorinated polyfluoroalkyl ether sulfonate	F-53B
9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	F-53B Major
11-chloroeicosafluoro-3-oxanonane-1-sulfonate	F-53B Minor

#### 4.8 Changes to Sampling Protocols

In a few limited instances, we were unable to collect shallow soil at a prescribed site because the OUPS ticket did not receive full clearance.

Occasionally a decision was made in the field not to sample a potential site within a State land because of access or safety concerns. In these cases, the concern was noted in the field notes (see Appendix B) and a secondary site was sampled instead (see Section 3.3 for how secondary sites were determined). Also, for the Veto Lake Wildlife Area we identified two potential drinking water sources that we planned to sample based on “water well-drinking water” locations shown on a park map (ODNR, 1997). However, in one case the water pump for the well was no longer in operation and in the second case we could not locate the drinking water well that was identified on the area map.

At one location, a GPS waypoint was not saved; however, we did photograph the GPS before sampling at the site. Therefore, the coordinates for this sampling location were pulled from the photograph. The date and time stamp on the GPS were compared to the sampling times at the site to verify the coordinates.

## 5. Results

This section presents the analytical results for soil, surface water, groundwater, drinking water, and plant samples. All PFAS concentration results are presented in units equivalent to parts per trillion.

### 5.1 Spatial Extent of Shallow Soil and Surface Water Contamination

In this section, we provide PFOA, GenX, and other PFAS results for shallow soil and surface water to characterize the spatial extent of PFAS contamination within our study area.

#### 5.1.1 PFOA and GenX Results

##### Shallow Soil

We collected a total of 221 shallow soil samples across all three objectives in 2019 (Figure 12). PFOA concentrations of these shallow soils ranged from 110 ng/kg to 23,000 ng/kg. In general, concentrations decreased with increasing distance from the Facility (Table 4),<sup>1</sup> although we found PFOA concentrations as high as 5,600 ng/kg over 35 miles away from the Facility and as high as 11,000 ng/kg 30 miles from the Facility (Table 5).

Overall, we found measurable PFOA concentrations in every shallow soil sample collected. The lowest concentration measured was 110 ng/kg, which was measured in one sample collected approximately 25 miles south of the Facility (Table 5). The sample with the highest concentration (23,000 ng/kg) was collected within the Veto Lake Wildlife Area, approximately 6 miles north of the Facility (see Table 9 in Section 5.3.1).

**Table 4. Shallow soil concentrations versus distance from Facility for PFOA and GenX**

Distance from Facility (miles)	Number of samples	PFOA			GenX		
		Minimum (ng/kg)	Maximum (ng/kg)	Average (ng/kg) <sup>a</sup>	Minimum (ng/kg)	Maximum (ng/kg)	Average (ng/kg) <sup>a</sup>
0–5	20	750	20,000	5,737	ND	5,200	1,251
> 5–10	23	420	23,000	4,465	ND	1,100	244
> 10–15	77	290	21,000	5,355	ND	12,000	563
> 15–20	25	290	13,000	3,552	ND	16,000	671
> 20–25	30	120	7,000	3,270	ND	250	60
> 25–30	18	110	7,500	2,733	ND	780	63
> 30–35	13	230	11,000	2,724	ND	250	36
> 35	15	140	5,600	1,668	ND	210	22

a. For averaging, samples with concentrations below the detection limit [i.e., not detected (ND)] were set to a concentration of zero.

1. To help describe the spatial distribution of PFOA and GenX contamination, we have presented PFOA/GenX concentrations in relation to distance from the Facility. However, we recognize other factors may influence dispersion and subsequent deposition of PFAS released to the air from the Facility, including prevailing wind directions, topography, and aspect; and therefore, Facility-related PFAS contamination may not be solely dependent on distance from the Facility.



**Figure 12. PFOA concentrations and sampling locations of shallow soil samples collected in 2019.** The concentric rings show the distance from the Facility, with the miles for each interval shown along the upper right side of the rings.

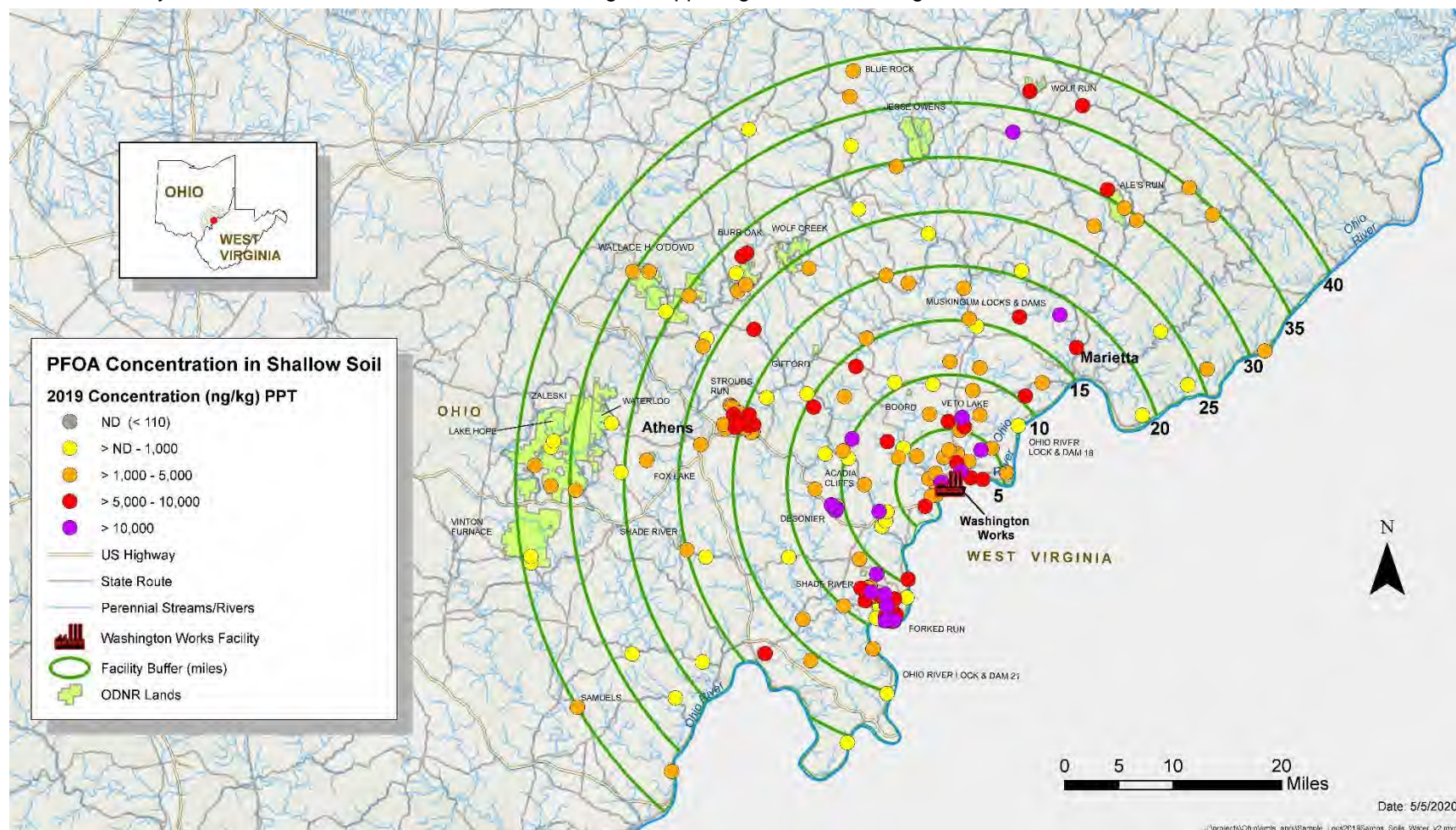




Table 5. PFOA and GenX results for shallow soil and surface water samples collected under Objective 1

Site ID	Grid number	County	Distance from Facility (miles)	Date	Road	Shallow soil		Sampled waterbody	Surface water	
						PFOA (ng/kg)	GenX (ng/kg)		PFOA (ng/L)	GenX (ng/L)
R100	1	Washington	1.3	9/18/2019	State Rte 124	4,300	2,300	Little Hocking River	53	11
R101	2	Athens	7.9	9/18/2019	State Rte 144	3,400	ND	Jordan Run	270	3.9
R102	3	Athens	12.4	9/18/2019	Co Rd 66	3,000	140	Green Run	37	ND
R103	4	Meigs	16.3	9/16/2019	State Rte 681	440	140	Middle Branch Shade River	34	1.8
R104	5	Meigs	23.5	9/16/2019	State Rte 681	770	140	West Branch Shade River	27	3.1
R105	5	Meigs	25.0	9/16/2019	State Rte 681	4,000	ND	Goose Creek	21	1.7
R106	7	Meigs	33.2	9/17/2019	State Rte 325	760	ND	Malloons Creek	32	2.7
R107	8	Vinton	39.3	9/17/2019	State Rte 160	140	ND	Pierce Run	27	ND
R108	9	Washington	2.0	9/17/2019	State Rte 618	7,900	2,300	Davis Creek	53	18
R109	11	Washington	2.7	9/16/2019	Dragstrip Rd	4,600	510	Mill Branch	980	150
R110	12	Washington	2.0	9/17/2019	State Rte 339	6,300	3,300	Little Hocking River	920	85
R111	13	Washington	2.5	9/16/2019	Short Brook Rd	1,600	590	Short Brook	900	43
R112	15	Washington	4.0	9/16/2019	Cave Hill Rd	2,900	610	Big Run	620	73
R113	16	Washington	1.7	9/18/2019	State Rte 124	4,400	1,100	Sawyer Run	83	7.4
R114	17	Washington	2.0	9/18/2019	State Rte 555	2,500	340	Little Hocking River	330	36
R115	18	Washington	5.3	9/17/2019	Congress Rd	1,300	610	Congress Creek	440	210,000
R116	20	Washington	5.0	9/16/2019	Twp Rd 40	2,300	330	Mill Branch	660	35
R117	21	Washington	8.8	9/16/2019	State Rte 550	2,500	ND	Tupper Creek	250	9.1
R118	22	Washington	9.3	9/16/2019	State Rte 550	620	ND	South Fork South Branch Wolf Creek	180	11
R119	23	Meigs	9.6	9/16/2019	State Rte 124	7,000	180	Sugarcamp Run	11	20
R120	24	Washington	5.4	9/16/2019	State Rte 555	680	160	Longs Run	260	8.7
R121	25	Athens	7.4	9/18/2019	State Rte 144	470	ND	Hocking River	6.4	ND
R122	26	Athens	9.7	9/19/2019	State Rte 144	680	ND	Rowell Run	180	1.6
R122	26	Athens	9.7	9/19/2019	State Rte 144	810	ND	Rowell Run	180	1.6
R123	27	Washington	12.6	9/19/2019	State Rte 550	1,500	750	Mile Run	140	ND
R124	28	Washington	14.7	9/16/2019	State Rte 339	590	ND	NA	NS	NS
R125	29	Washington	10.6	9/16/2019	State Rte 550	670	130	Laurel Run	130	12
R126	30	Meigs	14.1	9/16/2019	State Rte 248	530	ND	Guyan Run	120	6.6
R127	31	Washington	13.8	9/16/2019	State Rte 550	7,700	ND	Coal Run	67	1.4
R128	32	Meigs	14.9	9/16/2019	State Rte 248	2,800	9,100	Spicer Creek	110	6.3
R129	33	Athens	11.8	9/19/2019	State Rte 144	400	ND	Hocking River	3.6	ND

Table 5. PFOA and GenX results for shallow soil and surface water samples collected under Objective 1

Site ID	Grid number	County	Distance from Facility (miles)	Date	Road	Shallow soil		Sampled waterbody	Surface water	
						PFOA (ng/kg)	GenX (ng/kg)		PFOA (ng/L)	GenX (ng/L)
R130	34	Washington	18.8	9/19/2019	Sheets Run Rd	560	ND	Sheets Run	72	5.4
R131	35	Washington	17.1	9/19/2019	State Rte 60	6,300	220	Second Creek	19	ND
R132	36	Washington	18.0	9/16/2019	State Rte 339	1,800	ND	West Branch Wolf Creek	180	12
R133	37	Morgan	18.8	9/19/2019	State Rte 266	1,100	ND	Mill Run	38	ND
R134	38	Meigs	16.8	9/16/2019	State Rte 124	3,300	ND	DeWitt Run	13	17
R135	39	Washington	15.4	9/16/2019	State Rte 676	4,100	ND	Shrader Run	89	2.1
R136	40	Meigs	18.4	9/17/2019	State Rte 248	3,300	ND	Shade River	33	ND
R137	41	Athens	18.6	9/18/2019	State Rte 690	520	ND	McDougall Branch	210	ND
R138	42	Washington	23.7	9/19/2019	Twp Rd 19	810	ND	Newell Run	20	2.7
R139	43	Washington	23.9	9/19/2019	State Rte 26	470	ND	Moss Run	32	ND
R140	44	Washington	20.6	9/19/2019	State Rte 60	250	ND	Big Run	15	ND
R141	45	Morgan	23.0	9/19/2019	State Rte 60	950	ND	Perry Run	27	ND
R142	46	Meigs	20.2	9/17/2019	State Rte 124	120	190	NA	NS	NS
R143	47	Morgan	22.9	9/18/2019	State Rte 329	5,300	ND	Hyde Fork	46	ND
R144	48	Meigs	23.1	9/17/2019	State Rte 7a	5,300	ND	Kerr Run	24	ND
R145	49	Athens	23.2	9/18/2019	State Rte 682	2,900	ND	Coates Run	NS	NS
R146	50	Washington	25.9	9/19/2019	Co Rd 25	3,700	ND	Kesselring Run	33	ND
R147	51	Noble	29.7	9/18/2019	State Rte 145	3,200	ND	Middle Fork Duck Creek	18	ND
R148	52	Washington	27.1	9/18/2019	State Rte 821	4,500	ND	West Fork Duck Creek	22	ND
R149	53	Morgan	29.6	9/19/2019	State Rte 78	2,400	ND	Bear Run	8.6	ND
R150	54	Meigs	25.6	9/17/2019	State Rte 124	110	ND	Cooks Run	26	ND
R151	55	Athens	26.1	9/18/2019	State Rte 13	310	ND	Sunday Creek	4.5	ND
R152	56	Meigs	28.1	9/17/2019	State Rte 124	150	ND	Hysell Run	16	2.7
R153	57	Athens	26.0	9/18/2019	State Rte 13	1,700	ND	NA	NS	NS
R154	58	Washington	31.4	9/19/2019	State Rte 7	2,000	ND	Sheets Run	16	ND
R155	59	Monroe	34.6	9/18/2019	State Rte 260	3,000	ND	Indian Run	13	ND
R156	60	Noble	32.8	9/18/2019	State Rte 78	11,000	250	Sharon Fork	21	ND
R157	61	Morgan	32.3	9/19/2019	State Rte 376	890	ND	Mans Fork	11	ND
R158	62	Hocking	30.6	9/18/2019	State Rte 78	450	ND	Brush Fork	2.1	ND
R159	63	Gallia	32.1	9/17/2019	State Rte 554	610	ND	Jessie Creek	13	ND
R160	64	Athens	30.3	9/18/2019	State Rte 681	970	ND	Rockcamp Creek	9.4	ND
R161	59	Monroe	35.0	9/18/2019	State Rte 260	2,000	ND	Creighton Run	47	2.3

Table 5. PFOA and GenX results for shallow soil and surface water samples collected under Objective 1

Site ID	Grid number	County	Distance from Facility (miles)	Date	Road	Shallow soil		Sampled waterbody	Surface water	
						PFOA (ng/kg)	GenX (ng/kg)		PFOA (ng/L)	GenX (ng/L)
R162	67	Noble	36.8	9/18/2019	State Rte 78	5,100	120	Buffalo Creek	NS	NS
R163	68	Muskingum	36.7	9/19/2019	State Rte 376	1,400	ND	Dry Riffle Run	8.9	ND
R164	69	Morgan	37.5	9/19/2019	State Rte 555	210	ND	Ogg Creek	5	ND
R164	69	Morgan	37.5	9/19/2019	State Rte 555	250	ND	Ogg Creek	5	ND
R165	70	Gallia	36.8	9/17/2019	State Rte 7	1,100	ND	Campaign Creek	12	27
R166	71	Vinton	36.9	9/18/2019	State Rte 278	370	ND	Little Sandy Run	10	ND
R167	7	Vinton	34.5	9/17/2019	Gambill Hollow Rd	1,700	ND	Tedroe Run	6.8	ND
R168	8	Vinton	39.2	9/17/2019	Runyon Rd	180	ND	Pierce Run	4	ND
R169	8	Vinton	36.8	9/17/2019	Pearl McKibben Rd	2,500	ND	Wheelabout Creek	6.2	ND
R170	45	Morgan	20.0	9/19/2019	Muskingum River State Park Lock 6	1,900	ND	Muskingum River	4.8	ND
R171	47	Morgan	23.7	9/17/2019	S. Elliott Rd	3,200	ND	West Branch Wolf Creek	12	ND
R172	51	Noble	30.0	9/18/2019	Twp Rd 271	4,400	350	NA	NS	NS
R173	53	Morgan	26.6	9/19/2019	State Rte 376	940	ND	NA	NS	NS
R174	55	Athens	29.6	9/18/2019	Hunterdon Rd	2,300	ND	Mud Fork	47	ND
R175	57	Athens	28.0	9/18/2019	Fox Lake Boat Ramp Area	2,000	ND	Fox Lake	9.7	ND
R175	57	Athens	28.0	9/18/2019	Fox Lake Boat Ramp Area	2,200	ND	Fox Lake	9.7	ND
R176	60	Noble	30.7	9/18/2019	Co Rd 42	8,600	220	NA	NS	NS
R177	62	Hocking	33.9	9/18/2019	State Rte 216	3,200	ND	NA	NS	NS
R178	64	Athens	31.7	9/18/2019	Boat Ramp Area of small lake	230	ND	Penrod Lake	3.6	ND
R179	67	Noble	36.8	9/18/2019	Wolf Run Boat Ramp Area	5,600	ND	Wolf Run Lake	16	1.5
R180	68	Muskingum	38.9	9/19/2019	Blue Rock Boat Ramp Area	3,100	210	Culter Lake	20	2.1
R181	69	Hocking	35.1	9/18/2019	Sand Run-New Straitsville Rd	1,500	ND	NA	NS	NS
R182	70	Gallia	40.0	9/17/2019	State Rte 160	1,400	ND	Robinson Run tributary	11	ND
R183	71	Vinton	38.3	9/17/2019	E Raccoon Rd	1,200	ND	Raccoon Creek	5	ND
R184	71	Vinton	36.7	9/18/2019	Lake Hope Boat Ramp Area	970	ND	Lake Hope	5.5	ND

Concentrations of GenX in shallow soils ranged from not detected (< 100–150 ng/kg) to 16,000 ng/kg. GenX concentrations in the shallow soils were generally lower than corresponding PFOA concentrations (Table 5). As with PFOA, GenX concentrations generally decreased with increasing distance from the Facility (Table 4). However, the two highest shallow soil concentrations were measured in samples collected from Forked Run State Park and Strouds Run State Park, 13 and 19 miles from the Facility, respectively (see Figure 13).

### Surface Water

We collected a total of 109 surface water samples across all three objectives in 2019 (Figure 14). PFOA concentrations in surface water ranged from 2.1 ng/L to 980 ng/L. Similar to shallow soils, surface water PFOA concentrations generally decreased with increasing distance from the Facility; however, concentrations as high as 47 ng/L were found up to 35 miles from the Facility (Table 5). The highest-observed concentration, 980 ng/L, was from a sample collected 2.7 miles north of the Facility from Mill Branch, a small tributary to Little Hocking River (Table 6).

**Table 6. Surface water concentrations versus distance from Facility for PFOA and GenX.**

Distance from Facility (miles)	Number of samples	PFOA			GenX		
		Minimum (ng/L)	Maximum (ng/L)	Average (ng/L) <sup>a</sup>	Minimum (ng/L)	Maximum (ng/L)	Average (ng/L) <sup>a</sup>
0–5	10	53	980	463.90	7.4	150	49.84
> 5–10	15	6.4	660	311.16	ND	210,000 (41) <sup>b</sup>	20.24 <sup>c</sup>
> 10–15	20	3.6	410	167.58	ND	22	4.78
> 15–20	13	4.8	210	61.45	ND	17	2.95
> 20–25	11	5.6	44	22.78	ND	3.1	0.86
> 25–30	14	4.5	47	20.14	ND	2.7	0.31
> 30–35	12	2.1	32	11.55	ND	2.7	0.23
> 35	14	4	47	13.03	ND	27	2.35

a. For averaging, samples with concentrations below the detection limit (i.e., ND) were set to a concentration of zero.

b. Maximum concentration represents a single, high outlier. The next highest concentration is provided in parentheses.

c. Average does not include the 210,000 ng/L single-outlier concentration.

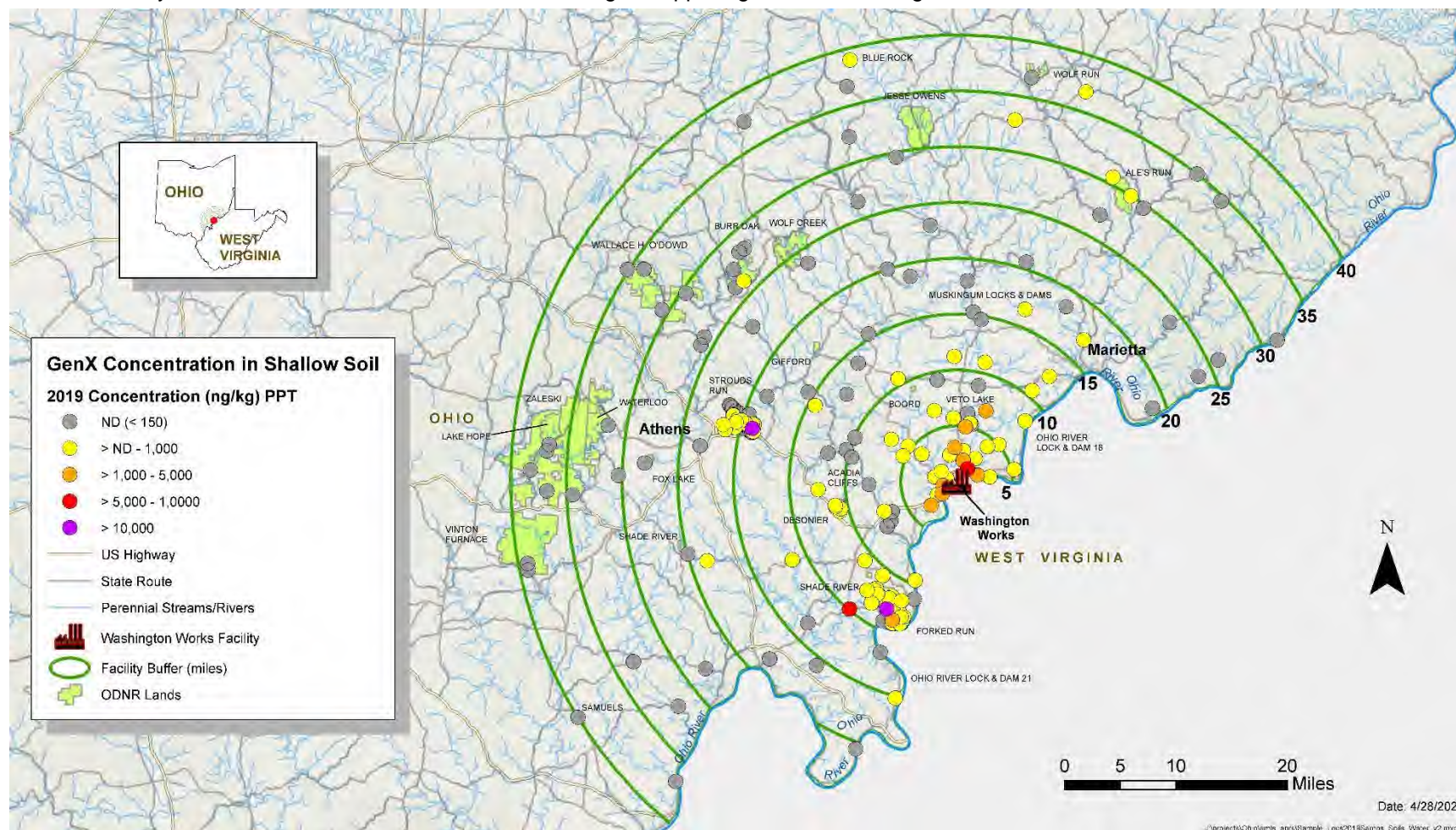
Concentrations of GenX in surface water ranged from ND (< 1.3–1.5 ng/L) to 210,000 ng/L (Table 6). The sample with the highest-observed concentration, 210,000 ng/L, was collected in Congress Creek, 5 miles east of the Facility. This result is a single, high outlier that is over three orders of magnitude higher than the next highest-observed concentration of 150 ng/L. We therefore excluded it from our averaging in Table 6, and our discussions below.

Like PFOA, GenX concentrations in surface water decreased with increasing proximity to the Facility (Table 6). Specifically, within 5 miles of the Facility, GenX was frequently detected above 10 ng/L, with three samples measuring above 70 ng/L and one sample measuring 150 ng/L; however, samples collected beyond 20 miles from the Facility were mostly ND, or below 3 ng/L if detected (Table 5).

One sample collected over 36 miles southwest of the Facility had GenX concentrations measured at 27 ng/L, which is considerably higher than other samples collected 20 or more miles from the Facility (Table 5; Figure 15). This sample was collected at the confluence of Campaign Creek and the Ohio River.

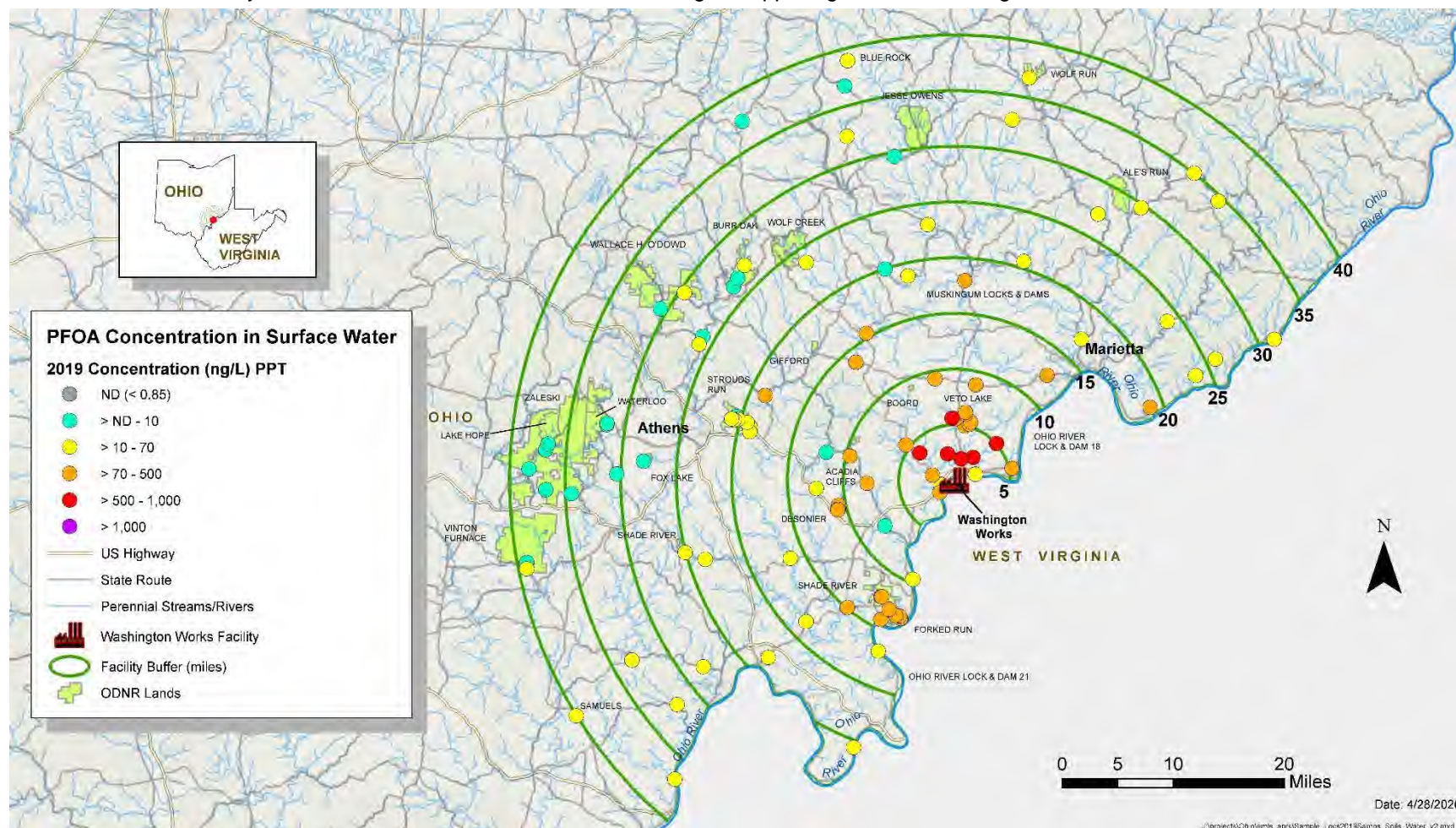


**Figure 13. GenX concentrations and sampling locations of shallow soil samples collected in 2019.** The concentric rings show the distance from the Facility, with the miles for each interval shown along the upper right side of the rings.



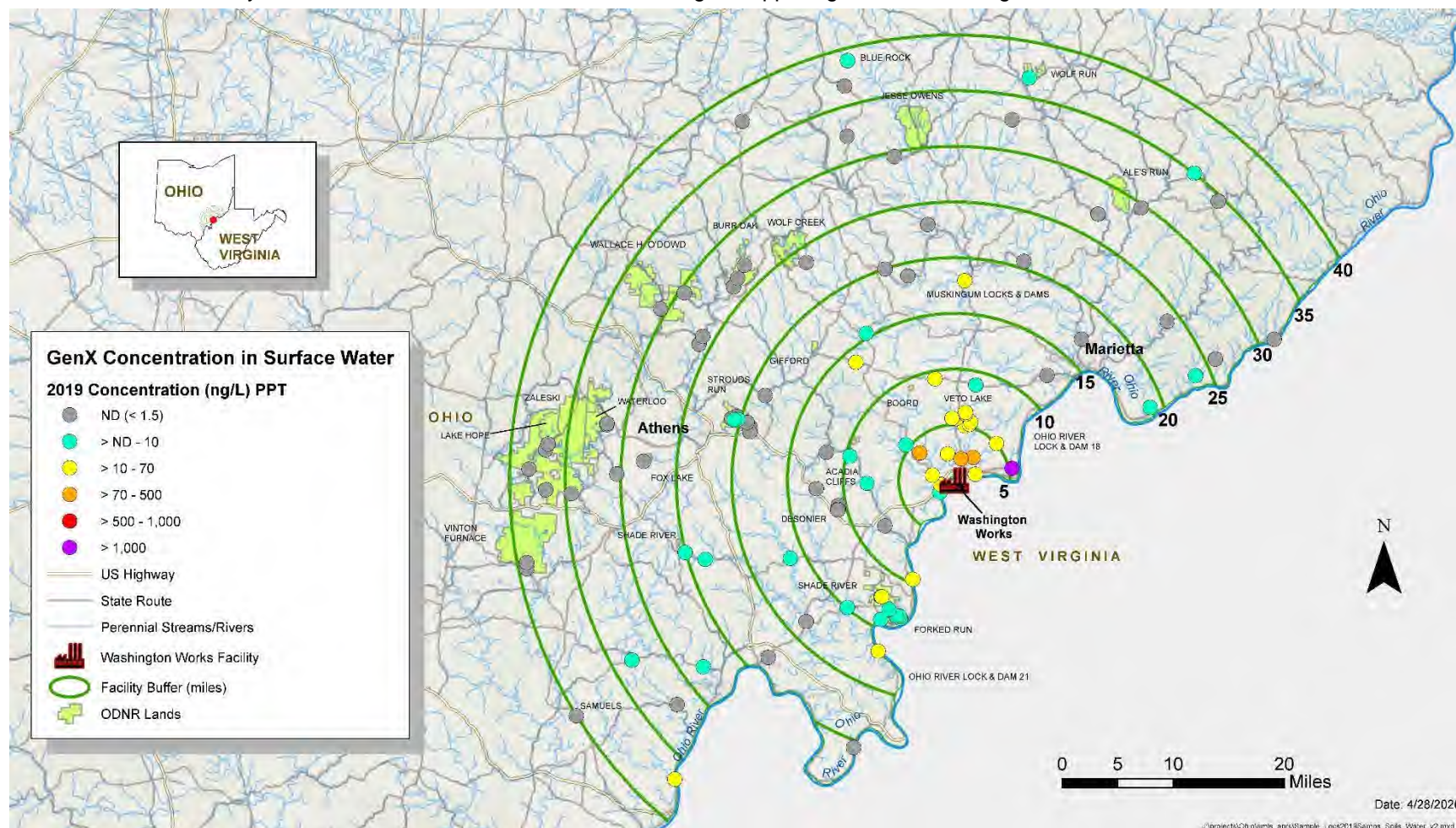


**Figure 14. PFOA concentrations and sampling locations of surface water samples collected in 2019.** The concentric rings show the distance from the Facility, with the miles for each interval shown along the upper right side of the rings.





**Figure 15. GenX concentrations and sampling locations of surface water samples collected in 2019.** The concentric rings show the distance from the Facility, with the miles for each interval shown along the upper right side of the rings.



### 5.1.2 Other PFAS

In addition to PFOA and GenX, the analytical method included analysis of 29 other PFAS (see Table 3 in Section 4.7). Of the 31 PFAS analyzed, 20 PFAS were not detected or detected infrequently (i.e., in less than 50% of shallow soil and surface water samples). For the other 11 PFAS, Table 7 presents the detection frequency and the minimum, maximum, and average concentrations in both shallow soil and surface water samples. While PFOA is the dominant PFAS found in our study area, other PFAS were also frequently detected in samples collected from this area. Perfluorooctanoic sulfonate (PFOS) was the most frequently detected perfluoroalkyl sulfonate (84% detection in shallow soils and 65% detection in surface water), with soil concentrations in the same range as GenX; however, maximum concentrations for GenX were higher than PFOS, particularly in surface water. Furthermore, GenX (and PFOA) trended with distance from the Facility, whereas elevated PFOS occurred more sporadically within our study area.

In addition to PFOS, seven other perfluoroalkyl carboxylic acids (PFCAs) were detected frequently in shallow soils and/or surface waters; however, overall concentrations of these PFCAs were generally low compared to PFOA and GenX concentrations (Table 7).

## 5.2 Shallow Soil and Nearby Private Well Concentrations

We collected 32 shallow soil samples within close proximity to private wells that had previously been sampled for PFOA as part of DuPont or Chemours monitoring efforts. These samples were collected within the right-of-way of State and county roads, similar to the roadside samples collected under Objective 1. Table 8 presents the shallow soil PFOA concentrations and the maximum and average PFOA concentrations from the corresponding private well. Note that the maximum and average PFOA concentrations for the private wells may be revised if additional data become available. Location IDs for the private wells were assigned by DuPont or Chemours.

## 5.3 Contamination within State Lands

In this section we present results of sampling conducted on State lands. These sampling efforts included (1) in-depth sampling at six selected State lands, (2) preliminary sampling at other State lands 20–40 miles from the Facility to assess the spatial extent of contamination, and (3) a canopy study at Forked Run State Park.

### 5.3.1 Selected State Lands for More In-Depth Sampling

At six selected State lands, we conducted a more in-depth sampling effort for shallow soil and surface water to get a better understanding of the distribution of PFAS contamination within each of these areas. In addition, we collected up to two soil profiles and a co-located groundwater sample at four of the State lands. Where we were able to identify drinking water sources within a State land, we also collected drinking water samples. In this section we present the results of this sampling in each of the six State lands. As a part of a canopy study, we collected shallow soil, plant tissue, and plant rinsate samples at Forked Run State Park, which is described separately in Section 5.3.3.

**Table 7. Detection frequencies and minimum, maximum, and average concentrations for other frequently detected PFAS (i.e., PFAS with > 50% detects in shallow soil or surface water).** PFOA and GenX are presented first for comparison.

Analyte	Carbon number	Shallow soils				Surface waters			
		% detects	Minimum (ng/kg)	Maximum (ng/kg)	Average (ng/kg) <sup>a</sup>	% detects	Minimum (ng/L)	Maximum (ng/L)	Average (ng/L) <sup>a</sup>
PFOA	C8	100	110	23,000	4,192	100	2.1	980	131
GenX	C6	49	ND	16,000	433	48	ND	210,000 (150) <sup>b</sup>	8.9 <sup>c</sup>
PFBA	C4	87	ND	1,200	329	93	ND	63	8.3
PFPeA	C5	59	ND	760	130	57	ND	52	2.6
PFHxA	C6	88	ND	720	200	89	ND	75	5.4
PFHpA	C7	91	ND	820	167	95	ND	32	4.1
PFNA	C9	92	ND	1,100	164	88	ND	6.0	0.9
PFDA	C10	89	ND	1,800	131	34	ND	2.3	0.2
PFUnA	C11	89	ND	3,100	162	4	ND	2.1	0.1
PFBS	C4	19	ND	160	9	58	ND	8.1	1.0
PFOS	C8	84	ND	13,000	702	65	ND	30	3.0

a. For averaging, samples with concentrations below the detection limit (i.e., ND) were set to a concentration of zero.

b. Maximum concentration represents a single, high outlier. The next highest concentration is provided in parentheses.

c. Average does not include the 210,000 ng/L single-outlier concentration.



**Table 8. PFOA and GenX results for shallow soil samples collected under Objective 2 and PFOA concentrations in the corresponding private well**

Shallow soil					Private well					
Site ID	Grid number	County	Distance from Facility (miles)	PFOA (ng/kg)	Location ID	Date range		# samples	Maximum PFOA (ng/L)	Average PFOA (ng/L)
W200	48	Meigs	20.7	4,400	47360HorseCaveRd	11/17/2005	2/15/2017	9	144	57
W201	30	Meigs	11.2	760	WhiteheadE	1/10/2006	8/30/2011	7	457	304
W203	32	Meigs	10.9	4,100	42230BrooksRd	9/14/2009	7/12/2016	2	170	135
W204	25	Athens	6.9	420	2750StRt144	5/8/2007	9/21/2016	11	730	535
W205	2	Athens	6.4	1,000	26890WBelprePike	10/3/2005	8/30/2016	12	927	669
W206	2	Athens	7.0	15,000	RealIDD	4/26/2007	4/26/2007	1	460	460
W207	16	Washington	3.1	5,500	390GantsvilleRd	7/1/2016	7/1/2016	1	3,700	3,700
W208	16	Washington	2.1	2,300	CantleyWA	7/19/2002	7/19/2002	1	1,430	1,430
W209	17	Washington	0.8	20,000	StahlPR2	4/8/2002	2/21/2006	9	12,700	7,234
W210	17	Washington	0.9	750	138EmoryLn	4/8/2002	8/31/2016	26	22,100	10,988
W210	17	Washington	0.9	790	138EmoryLn	4/8/2002	8/31/2016	26	22,100	10,988
W211	9	Washington	3.0	7,100	2725BeachDr	8/14/2002	9/27/2016	11	2,200	1,498
W212	15	Washington	1.6	3,600	19MeadowcrestLn	7/25/2002	9/15/2016	12	2,300	1,827
W213	11	Washington	1.5	17,000	WatsonMP2	4/18/2002	2/21/2006	6	27,100	19,167
W214	26	Washington	5.3	4,500	4220WelchRD	11/29/2005	8/31/2016	9	1,100	660
W215	12	Washington	2.8	4,200	2128StRt339	5/21/2007	9/19/2016	11	2,700	2,036
W216	33	Athens	10.3	3,400	22696BeebeRd	7/1/2016	7/1/2016	1	31	31
W216	33	Athens	10.3	3,200	22696BeebeRd	7/1/2016	7/1/2016	1	31	31
W217	11	Washington	4.2	12,000	3986BraunRd	6/6/2007	9/20/2016	14	2,700	2,007
W218	13	Washington	3.1	3,700	SpenceR	1/14/2005	1/14/2005	1	86	86
W219	24	Washington	6.9	5,100	900TurkeyHollowRd	1/5/2005	8/31/2016	13	193	146
W220	26	Washington	9.9	12,000	EnglandTK	6/1/2007	6/1/2007	1	400	400
W221	20	Washington	8.2	640	BrittonJM	5/29/2007	5/29/2007	1	2,700	2,700
W222	21	Washington	6.9	2,500	SmithGD	6/8/2007	6/8/2007	1	1,600	1,600
W223	22	Washington	6.6	4,800	2064DarnoldRd	1/6/2005	7/1/2016	3	86	66
W224	33	Athens	14.4	5,900	19933FeltonRd	4/18/2017	8/31/2018	2	74	70
W226	31	Athens	12.6	4,200	13450BrillRd	9/8/2009	6/23/2016	3	240	210
W227	27	Washington	10.6	5,500	750BrushRd	5/11/2007	11/30/2016	12	950	592

**Table 8. PFOA and GenX results for shallow soil samples collected under Objective 2 and PFOA concentrations in the corresponding private well**

Shallow soil					Private well					
Site ID	Grid number	County	Distance from Facility (miles)	PFOA (ng/kg)	Location ID	Date range		# samples	Maximum PFOA (ng/L)	Average PFOA (ng/L)
W228	39	Athens	15.5	600	19223SandRockRd	4/19/2017	8/31/2018	2	290	280
W229	28	Washington	11.0	2,500	1164FisherRidgeRd	10/24/2007	9/21/2016	9	720	517
W230	29	Washington	11.2	3,000	ThornberryW	10/20/2005	9/21/2011	8	240	120
W231	36	Washington	15.2	3,800	2905CampHervidaRd	12/8/2016	8/30/2018	4	110	62
W232	36	Washington	16.6	5,700	2766RainbowRd	1/20/2017	8/29/2018	5	97	87
W232	36	Washington	16.6	5,400	2766RainbowRd	1/20/2017	8/29/2018	5	97	87
W233	35	Washington	18.5	13,000	2675MuskingumRiverRd	4/13/2017	8/27/2018	3	370	333

### Veto Lake Wildlife Area

We collected five shallow soil samples and seven surface water samples from the Veto Lake Wildlife Area (Table 9), which is approximately 5 miles north of the Facility. We also collected two soil cores using Geoprobe® direct-push technology; however, we were only able to reach and collect groundwater from one of the borings. For shallow soils, PFOA concentrations ranged from 880 ng/kg to 23,000 ng/kg and GenX concentrations ranged from ND to 1,200 ng/kg (Table 9). The sample with the highest PFOA concentration was collected from the northern part of the Veto Lake Wildlife Area near an inlet to the lake, while the sample with the lowest PFOA concentration (i.e., 880 ng/kg) was collected from the southern part of the area just below the dam (see Figure 16). For GenX, concentrations were generally lower than PFOA, with two samples measuring below detection limits (see Figure 17). The sample with the highest GenX concentration (1,200 ng/kg) was collected in the southern part of the Veto Lake Wildlife Area along Veto Rd.

**Table 9. Shallow soil, surface water, and groundwater samples collected from the Veto Lake Wildlife Area**

Site ID	Distance from Facility (miles)	PFOA	GenX
<b>Shallow soil</b>		<b>ng/kg</b>	<b>ng/kg</b>
S321	6.2	23,000	ND
S322	5.3	880	ND
S311	5.0	3,300	1,200
S730	5.4	5,500	350
S731	5.7	7,600	660
<b>Surface water</b>		<b>ng/L</b>	<b>ng/L</b>
S321	6.2	390	33
S313	5.0	390	39
S314	5.2	410	38
S315	5.4	380	29
S316	6.1	400	41
S317	5.6	320	30
S318	5.6	510	23
<b>Groundwater</b>		<b>ng/L</b>	<b>ng/L</b>
S322	5.3	410	15

For surface water, PFOA concentrations ranged from 320 ng/L to 510 ng/L and GenX concentrations ranged from 23 ng/L to 41 ng/L (Table 9). We collected five surface water samples from different parts of the Veto Lake Wildlife Area, and two samples from an inlet and an outlet to the lake (Figure 16). Overall, PFOA and GenX concentrations were relatively consistent across all surface water samples.



Figure 16. Map of PFOA concentrations for samples of all media types collected in Veto Lake Wildlife Area.

**PFOA Concentrations****Roads and Trails**

- Roads
- Trails
- Streams
- Veto Lake

**Shallow Soils (ng/kg) PPT**

- ND (< 110)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 0.85)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Groundwater (ng/L) PPT**

- ▲ ND (< 0.94)
- ▲ > ND - 10
- ▲ > 10 - 70
- ▲ > 70 - 500
- ▲ > 500 - 1,000
- ▲ > 1,000

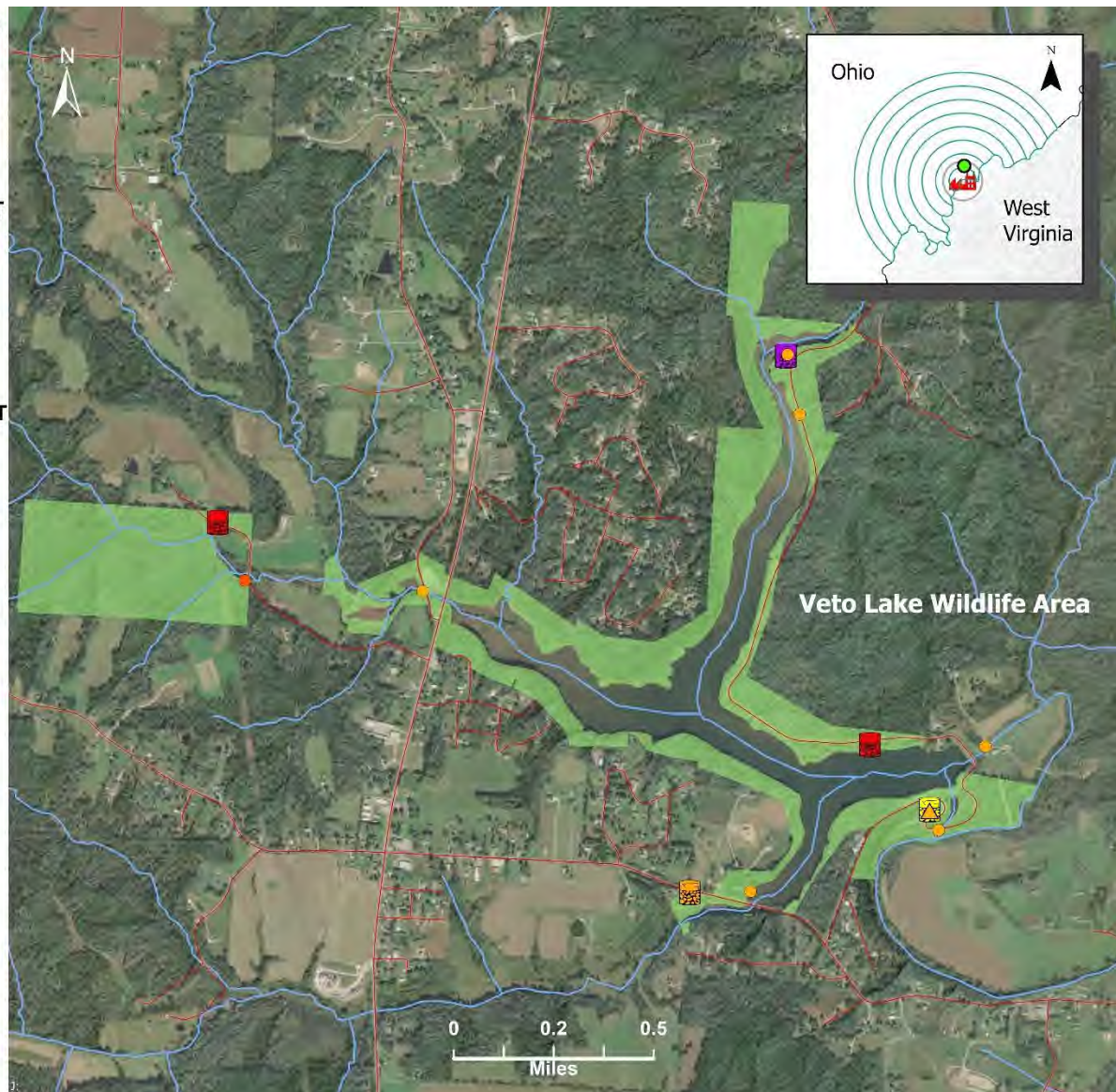




Figure 17. Map of GenX concentrations for samples of all media types collected in Veto Lake Wildlife Area.

**GenX Concentrations****Roads and Trails**

- Roads
- Trails
- Streams
- Veto Lake

**Shallow Soils (ng/kg) PPT**

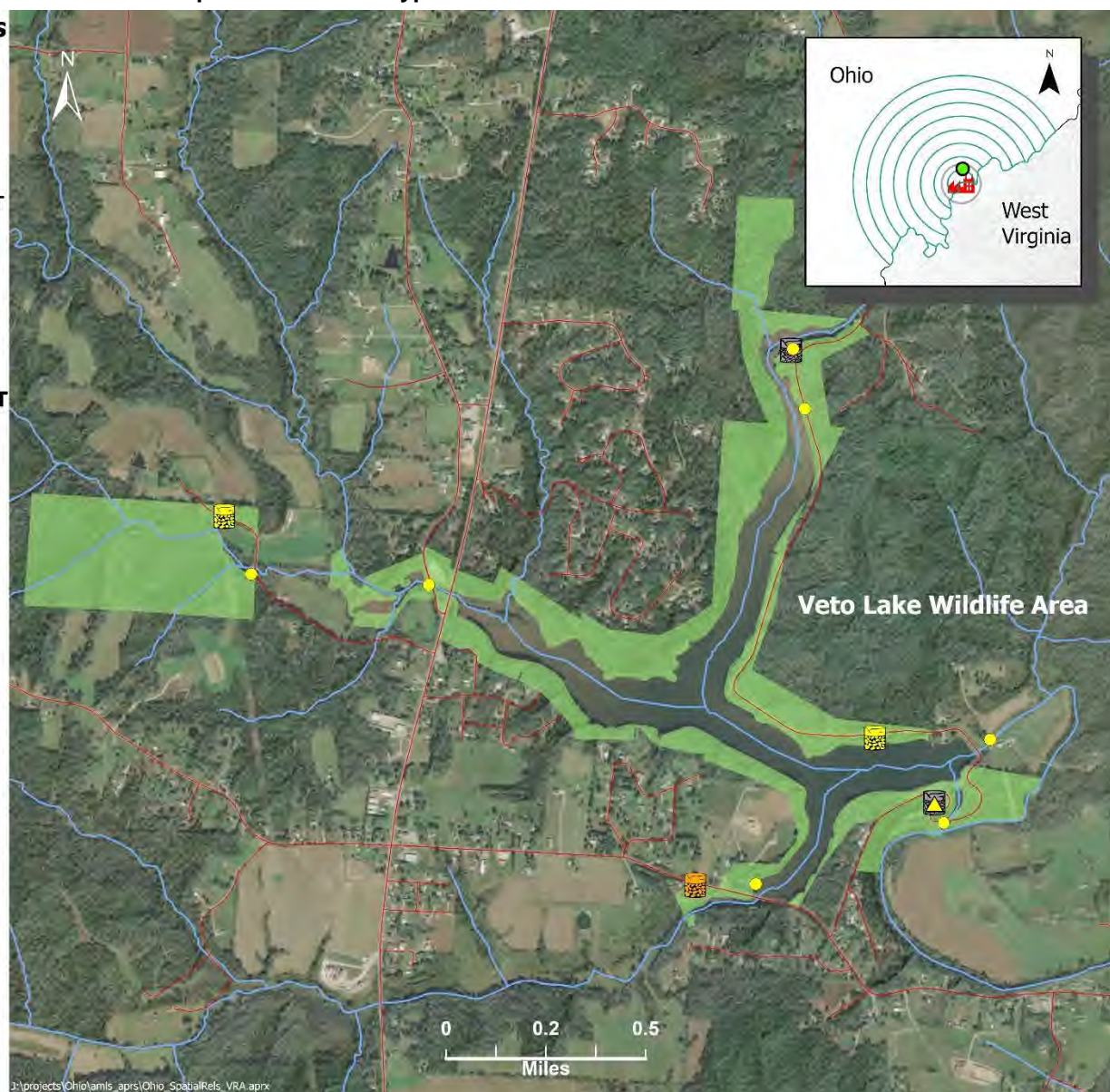
- ND (< 150)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Groundwater (ng/L) PPT**

- ND (< 5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000



In the one groundwater sample we collected from the soil boring taken below the dam, the PFOA concentration was 410 ng/L and the GenX concentration was 15 ng/L, which are generally similar to the PFOA and GenX concentrations measured in surface waters collected from the area (Table 9). In the soil profile collected just below the dam, the PFOA concentration in the shallowest soil sample was 880 ng/kg, while the deeper soil samples ranged from 120 ng/kg to 280 ng/kg (Table 10). In the second boring collected from the northern part of the area, the PFOA concentration in the shallowest soil sample was 23,000 ng/kg, while concentrations in the deeper samples ranged from 1,300 ng/kg to 2,300 ng/kg (Table 10). For both soil profiles, the shallowest soil sample had the highest PFOA concentration. For GenX, all soil profile samples were non detects.

**Table 10. PFOA and GenX concentrations from soil boring and groundwater (or adjacent surface water) samples**

State land	Site ID	Soil lithology/ water type	Depth (ft)	Soil PFOA (ng/kg)	Water PFOA (ng/L)	Soil GenX (ng/kg)	Water GenX (ng/L)
Veto Lake	S321	V	0.5	23,000		ND	
		V	5.5	2,300		ND	
		V	5.5	1,300		ND	
		V	11.5	ND		ND	
		SW	0		390		33
Veto Lake	S322	V	0.5	880		ND	
		V	5.5	280		ND	
		V	11.5	120		ND	
		V	17.5	150		ND	
		S	27.5	210		ND	
		GW	25–30		410		15
Shade River	S368	V	0.5	1,500		ND	
		V	5.5	2,700		ND	
		V	9.5	1,900		ND	
		SW	0		410		22
Forked Run	S387	V	0.5	2,000		ND	
		V	0.5	2,400		ND	
		V	6.5	ND		ND	
		V	12.5	ND		ND	
		S	22.5	ND		ND	
		GW	19.5–25		ND		2.4
		GW	19.5–25		ND		1.8
Forked Run	S389	V	0.5	6,300		ND	
		V	3.5	890		ND	
		V	7.5	440		ND	
		S	12.5	260		ND	
		GW	10–20		100		ND



**Table 10. PFOA and GenX concentrations from soil boring and groundwater (or adjacent surface water) samples**

State land	Site ID	Soil lithology/ water type	Depth (ft)	Soil PFOA (ng/kg)	Water PFOA (ng/L)	Soil GenX (ng/kg)	Water GenX (ng/L)
Strouds Run	S424	V	0.5	220		ND	
		S	5.5	ND		ND	
		S	7.5	ND		ND	
		S	11.5	ND		ND	
		GW	9.5–15		35		6.1
Strouds Run	S425	V	0.5	2,800		ND	
		V	4.5	110		ND	
		V	7.5	ND		ND	
		S	11.5	ND		ND	
		GW	9.5–15		18		ND

GW = groundwater, S = saturated zone, SW = surface water, V = vadose zone.

### Desonier State Nature Preserve

At Desonier State Nature Preserve, which is approximately 10 miles west of the Facility, we collected five shallow soil samples plus a field duplicate sample, and four surface water samples plus a field duplicate sample (Figure 18). For the shallow soils, PFOA concentrations ranged from 290 to 13,000 ng/kg; however, we note that four out of the five shallow soil samples collected in the preserve had concentrations greater than 10,000 ng/kg (Table 11). For GenX, the shallow soil concentrations were generally low, ranging from ND to 520 ng/kg (Table 11).

**Table 11. Shallow soil and surface water samples collected from Desonier State Nature Preserve**

Site ID	Distance from Facility (miles)	PFOA	GenX
<b>Shallow soil</b>		<b>ng/kg</b>	<b>ng/kg</b>
S324	10.8	13,000	280
S325	10.7	13,000	300
S326	11.1	9,800	350
S326	11.1	11,000	520
S327	11.1	11,000	350
S328	10.6	290	ND
<b>Surface water</b>		<b>ng/L</b>	<b>ng/L</b>
S329	10.7	300	ND
S330	10.6	250	ND
S331	10.7	410	ND
S332	10.8	100	ND
S332	10.8	98	ND

For surface waters, PFOA concentrations ranged from 98 ng/L to 410 ng/L. GenX, however, was not detected in any of the surface water samples collected from the preserve. Table 11 provides the PFOA and GenX results from the sampling conducted at Desonier State Nature Preserve, and Figures 18 and 19 provide maps of the PFOA and GenX data, respectively.

Figure 18. Map of PFOA concentrations for samples of all media types collected in Desonier State Nature Preserve.

**PFOA Concentrations****Roads and Trails**

- Roads
- Trails
- Streams

Desonier Nature Preserve

**Shallow Soils (ng/kg) PPT**

- ND (< 110)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 0.85)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

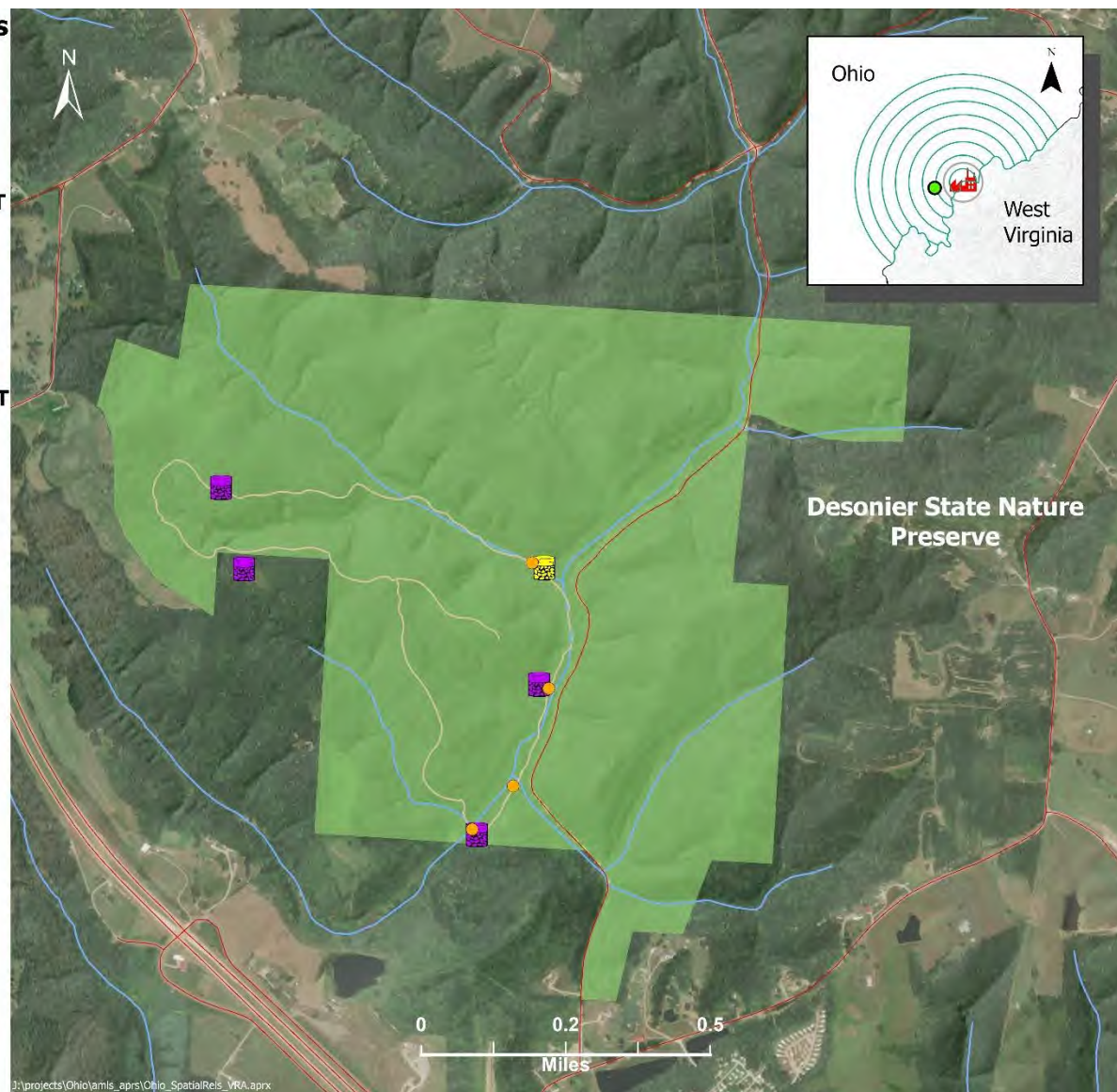




Figure 19. Map of GenX concentrations for samples of all media types collected in Desonier State Nature Preserve.

**GenX Concentrations****Roads and Trails**

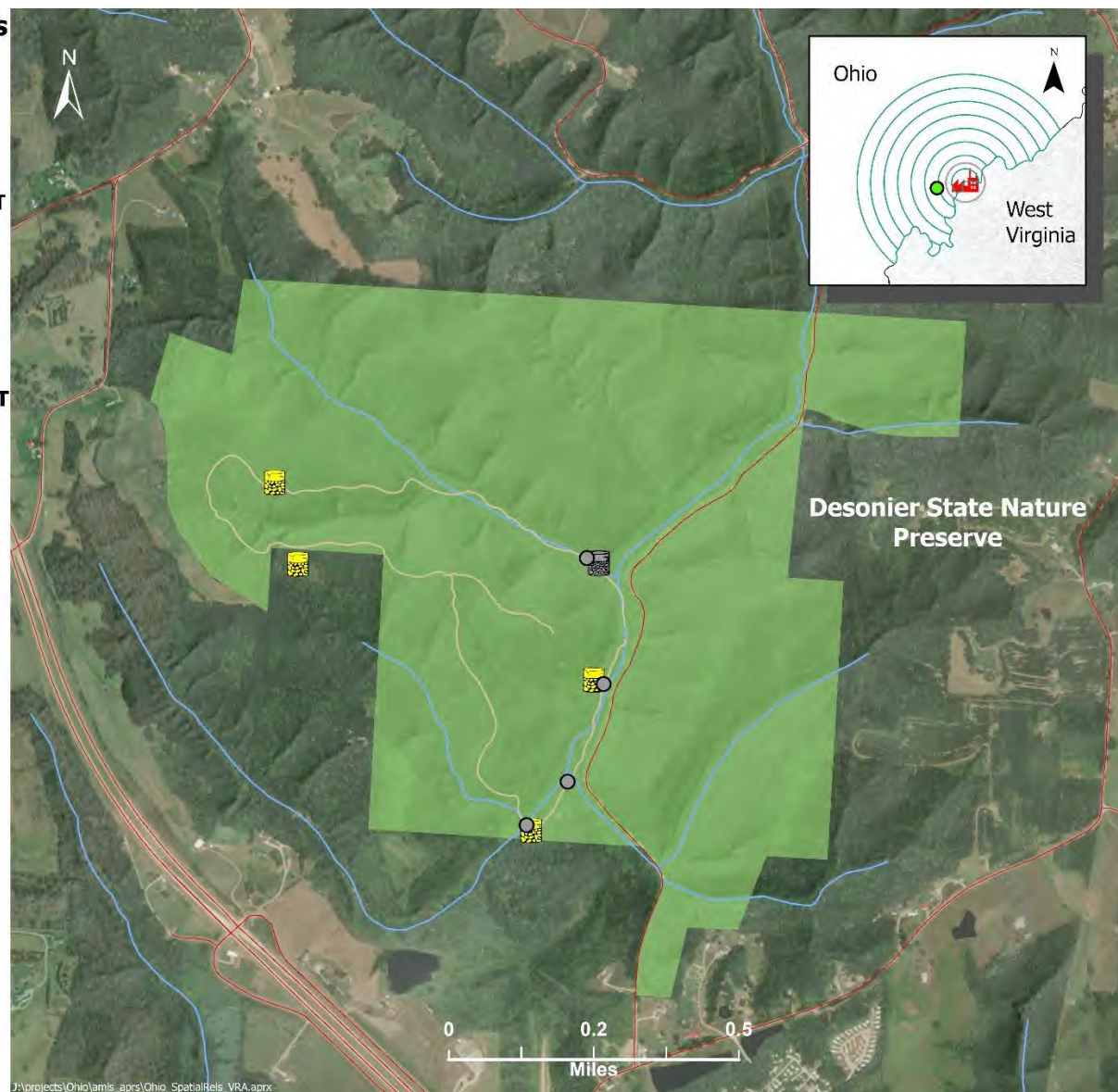
- Roads
- Trails
- Streams
- Desonier Nature Preserve

**Shallow Soils (ng/kg) PPT**

- ND (< 150)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000





### Shade River State Forest

At Shade River State Forest, which is approximately 12 miles southwest of the Facility, we collected 31 shallow soil samples plus two field duplicates, and 3 surface water samples plus 1 field duplicate. For shallow soils, PFOA concentrations ranged from 750 ng/kg to 21,000 ng/kg, while GenX concentrations ranged from ND to 780 ng/kg (Table 12). For surface waters, PFOA concentrations ranged from 130 ng/L to 410 ng/L and GenX concentrations ranged from 4.6 ng/L to 22 ng/L. Figures 20 and 21 provide maps of the PFOA and GenX data, respectively, from the sampling conducted at Shade River State Forest.

**Table 12. Shallow soil and surface water samples collected from Shade River State Forest**

Site ID	Distance from Facility (miles)	PFOA	GenX
Shallow soil		ng/kg	ng/kg
S368	12.4	1,500	ND
S334	12.0	2,500	350
S335	13.0	2,500	190
S336	12.2	4,300	170
S338	13.3	8,600	450
S338	13.3	8,400	520
S340	13.0	5,800	190
S341	12.3	8,100	ND
S342	12.7	4,300	ND
S343	11.8	2,000	190
S344	12.2	7,000	ND
S345	11.8	21,000	290
S346	12.7	11,000	250
S347	12.9	4,100	480
S348	12.8	1,000	140
S349	12.0	1,400	320
S351	13.1	1,300	720
S352	12.4	2,000	300
S353	12.4	1,600	120
S354	12.6	6,900	260
S355	12.2	4,800	470
S357	12.5	2,400	560
S358	12.2	7,100	660
S359	12.7	920	510
S361	12.3	1,700	ND
S361	12.3	2,000	ND
S362	11.8	6,600	260
S363	12.2	9,000	780
S577	13.1	4,700	360
S578	10.7	16,000	730
S579	12.1	7,200	510
S580	12.3	11,000	570

**Table 12. Shallow soil and surface water samples collected from Shade River State Forest**

Site ID	Distance from Facility (miles)	PFOA	GenX
S584	13.0	750	ND
<b>Surface water</b>		<b>ng/L</b>	<b>ng/L</b>
S368	12.3	410	22
S364	12.4	130	5
S364	12.4	150	5
S365	12.3	400	14

We collected one soil boring from the Shade River State Forest, with soil PFOA concentrations ranging from 1,500 ng/kg to 2,700 ng/kg in the vertical soil profile (Table 10). The Geoprobe® met refusal when encountering shallow bedrock before we were able to reach groundwater, so no groundwater samples were collected. Instead the team collected a surface water sample from the stream adjacent to the boring site, with a PFOA concentration of 410 ng/L. PFOA and GenX concentrations of soil samples collected from the soil boring and of the nearby surface water sample are shown in Table 10.

#### **Forked Run State Park**

At Forked Run State Park, which is approximately 13 miles southwest of the Facility, we collected 20 shallow soil samples plus 1 field duplicate and 4 surface water samples. We also collected two vertical soil profiles and three groundwater samples, one from each boring plus a field duplicate. Finally, we collected two drinking water samples from drinking water spigots in the Forked Run State Park campground.

For shallow soils, PFOA concentrations ranged from ND to 16,000 ng/kg and GenX concentrations ranged from 570 ng/kg to 16,000 ng/kg (Table 13). In general, soil samples with the highest PFOA concentrations were collected along the southern border of the park near the Ohio River (see Figure 20). A similar pattern was not obvious with GenX. Instead, the sample with the highest-observed concentration was collected from the northern part of the park. This sample had a GenX concentration of 12,000 ng/kg, which is considerably higher than other samples in the Forked Run State Park and other nearby areas (Figure 21).

For surface water, three of the four samples were collected from Forked Run Lake and the final sample was collected at the outfall of the lake. PFOA concentrations in the surface water ranged from 76 ng/L to 140 ng/L and GenX concentrations ranged from 3.5 ng/L to 6.8 ng/L (Table 13). Overall, PFOA and GenX surface water concentrations were relatively consistent. In particular, for the samples collected within the lake itself, concentrations across the three samples were nearly identical for both PFOA and GenX, and approximately double the concentrations measured at the outfall of the lake (Table 13).

Two soil borings were collected from Forked Run, both from the southern end of the park below the dam. The PFOA concentration of groundwater collected from one of the soil borings was 100 ng/L, similar to the surface water concentrations. However, the PFOA concentration of the groundwater from the second boring was ND. Soil concentrations and groundwater concentrations from the two boring are provided in Table 10.

Figure 20. Map of PFOA concentrations for samples of all media types collected in Shade River State Forest and Forked Run State Park.

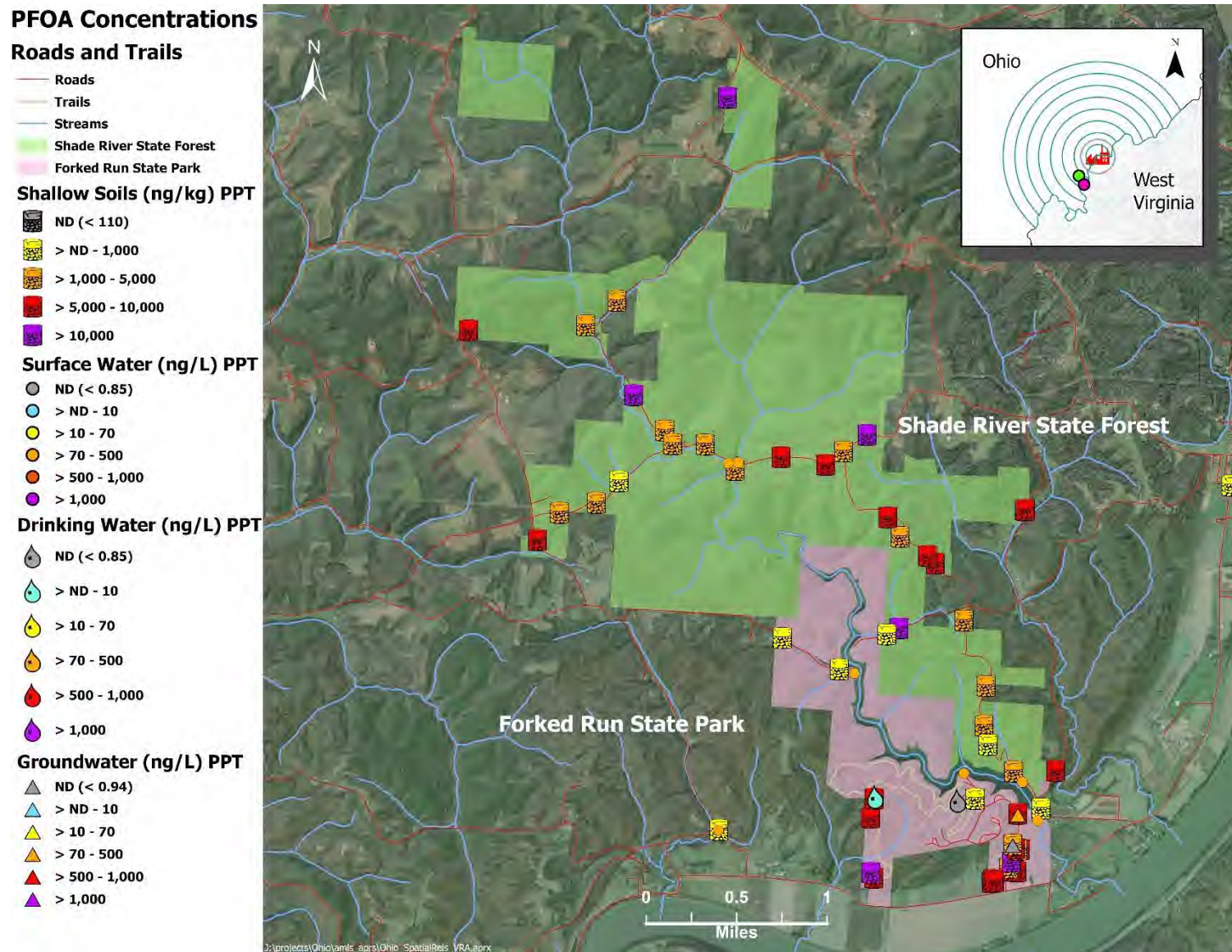




Figure 21. Map of GenX concentrations for samples of all media types collected in Shade River State Forest and Forked Run State Park.

**GenX Concentrations****Roads and Trails**

- Roads
- Trails
- Streams
- Shade River State Forest
- Forked Run State Park

**Shallow Soils (ng/kg) PPT**

- ND (< 150)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

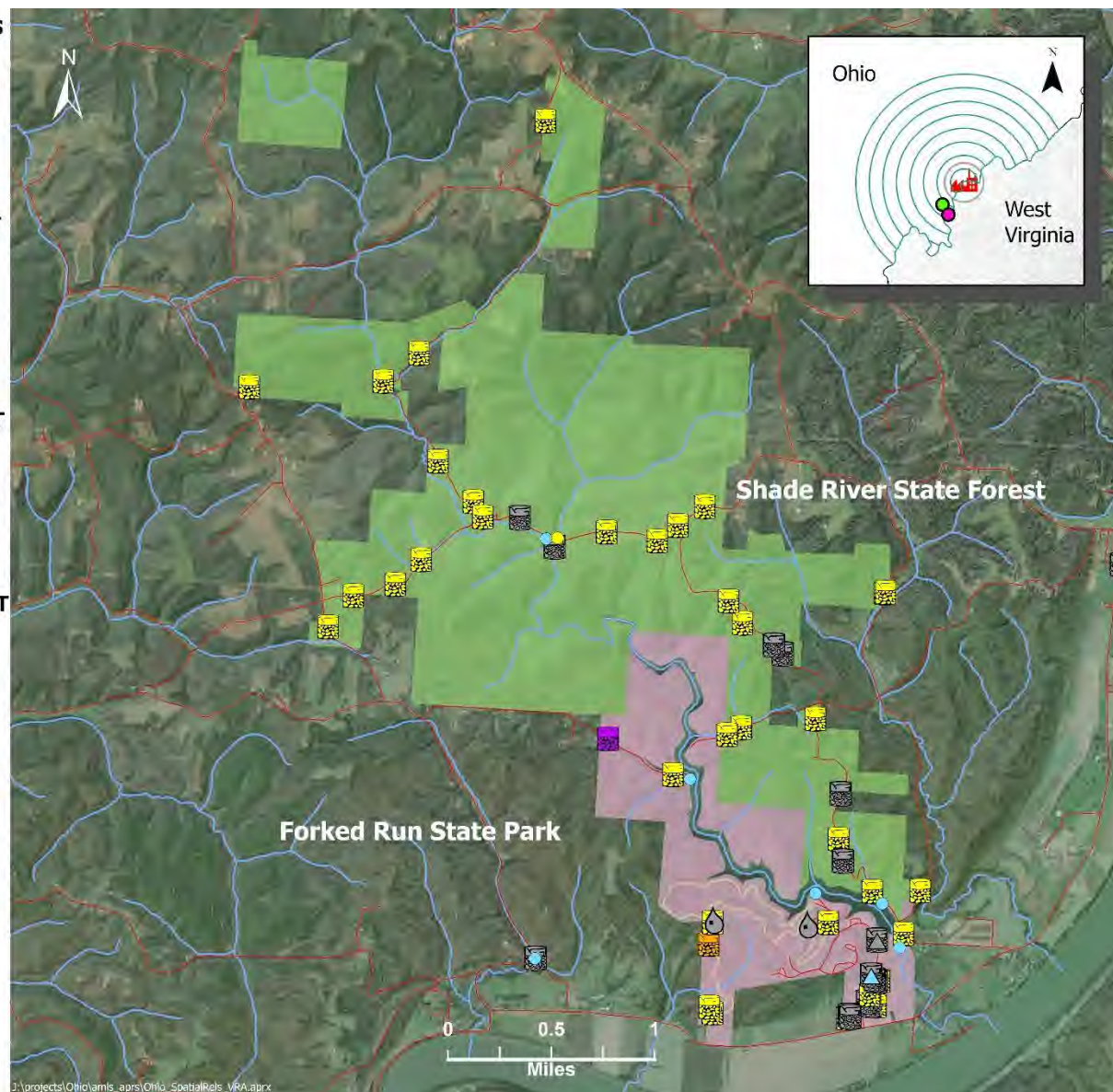
- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Drinking Water (ng/L) PPT**

- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Groundwater (ng/L) PPT**

- ND (< 5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000



**Table 13. Shallow soil, surface water, groundwater, and drinking water samples collected from Forked Run State Park**

Site ID	Distance from Facility (miles)	PFOA	GenX
<b>Shallow soil</b>		<b>ng/kg</b>	<b>ng/kg</b>
S387	13.5	2,000	ND
S387	13.5	2,400	ND
S389	13.3	6,300	ND
S384	13.6	16,000	660
S384	13.6	3,600	ND
S384	13.6	7,700	340
S384	13.6	6,900	ND
S385	13.5	9,300	600
S385	13.5	5,500	ND
S385	13.5	4,400	ND
S386	13.7	9,700	ND
S386	13.7	5,600	ND
S386	13.7	9,700	490
S370	14.0	7,800	310
S371	13.3	920	300
S372	14.0	12,000	770
S373	13.7	5,400	2,500
S374	13.6	7,700	310
S375	13.2	980	310
S376	13.0	580	12,000
S377	13.0	570	570
<b>Surface water</b>		<b>ng/L</b>	<b>ng/L</b>
S378	13.3	76	3.5
S379	13.1	140	6.8
S380	13.2	140	6.7
S381	13.0	140	6.6
<b>Groundwater</b>		<b>ng/L</b>	<b>ng/L</b>
S387	13.5	ND	2.4
S387	13.5	ND	1.8
S389	13.3	100	ND
<b>Drinking water</b>		<b>ng/L</b>	<b>ng/L</b>
B100	13.6	1.4	ND
B200	13.4	ND	ND

Drinking water concentrations from the two samples collected at Forked Run were very low to ND for both PFOA and GenX (Table 13). ODNR has indicated that the drinking water at the Forked Run State Park is supplied by a nearby water district, which is treated prior to distribution, and is not supplied by groundwater from within the park.

### Strouds Run State Park

At Strouds Run State Park, which is approximately 20 miles from the Facility, we collected 26 shallow soil samples plus 2 field duplicates and 7 surface water samples. We also collected two soil profiles and two groundwater samples, one from each boring. Finally, we collected one drinking water sample plus a field duplicate from a drinking water spigot at a boat ramp on the north end of Dow Lake (Figure 22).

For the shallow soils, PFOA concentrations ranged from 220 ng/kg to 7,400 ng/kg and GenX concentrations ranged from ND to 16,000 ng/kg (Table 14). For surface water, PFOA concentrations ranged from 5.6 ng/L to 63 ng/L and GenX concentrations ranged from ND to 2 ng/L (Table 14). PFOA concentrations in both shallow soils and surface water were relatively consistent across the park. For GenX, concentrations in the shallow soils and surface water were relatively low except for one shallow soil sample with a concentration of 16,000 ng/kg, which is two orders of magnitude higher than the next highest-observed shallow soil concentration.

Two soil borings were collected from Strouds Run, one from the southern end of the park below the dam and another from the northern end of Dow Lake (Figure 22). The PFOA concentrations in the groundwater collected from the two soil borings were 35 ng/L and 18 ng/L, respectively. These concentrations are similar to the surface water concentrations, which ranged from 6 ng/L to 63 ng/L and averaged 29 ng/L (Table 14). PFOA and GenX concentrations of soil samples collected from the two soil boring are provided in Table 10.

The PFOA and GenX concentrations in the drinking water sample were both low (1.8 and ND, respectively; Table 14). Like Forked Run State Park, ODNR has indicated this drinking water is provided by a nearby water district and is not supplied directly by groundwater in the park. Table 14 provides the PFOA and GenX results from the sampling conducted at Strouds Run State Park; and Figures 22 and 23 provide maps of the PFOA and GenX data, respectively.

### Burr Oak State Park

At Burr Oak State Park, approximately 26 miles northwest of the Facility, we collected five shallow soil samples and three surface water samples. All three surface water samples were collected from Burr Oak Lake, the large lake within Burr Oak State Park. We also collected one drinking water sample from a drinking water spigot in the park campground.

For shallow soils, PFOA concentrations ranged from 990 ng/kg to 7,500 ng/kg and GenX samples ranged from ND to 780 ng/kg (Table 15). The two highest PFOA concentrations were measured in samples collected from the northern part of the park (see Figure 24). Only one shallow soil sample from Burr Oak State Park had detectable levels of GenX (see Figure 25).

For surface waters, PFOA concentrations ranged from 9.5 ng/L to 11 ng/L, while GenX was not detected in the three samples collected from this area. Overall, PFOA and GenX concentrations in the surface water samples were very consistent across the lake. Table 15 provides the PFOA and GenX results from the sampling conducted at Burr Oak State Park.

The PFOA and GenX concentrations in the drinking water sample were both low (1.8 and ND, respectively; Table 15). We do not know the source of the drinking water in Burr Oak State Park.



Figure 22. Map of PFOA concentrations for samples of all media types collected in Strouds Run State Park.

**PFOA Concentrations****Roads and Trails**

- Roads
- Trails
- Streams
- Strouds Run State Park

**Shallow Soils (ng/kg) PPT**

- ND (< 110)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 0.85)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Drinking Water (ng/L) PPT**

- ND (< 0.85)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Groundwater (ng/L) PPT**

- ▲ ND (< 0.94)
- ▲ > ND - 10
- ▲ > 10 - 70
- ▲ > 70 - 500
- ▲ > 500 - 1,000
- ▲ > 1,000

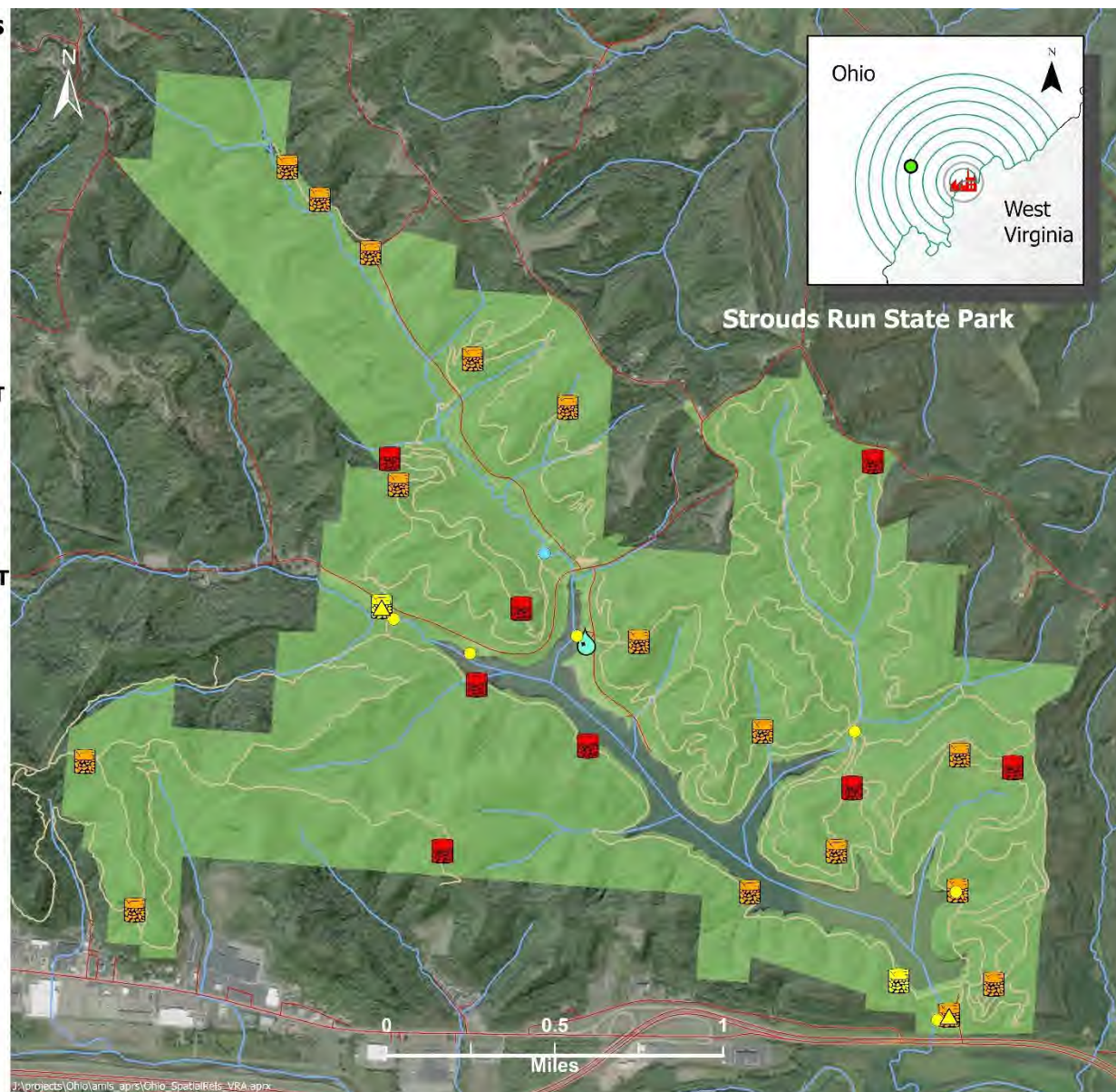




Figure 23. Map of GenX concentrations for samples of all media types collected in Strouds Run State Park.

**GenX Concentrations****Roads and Trails**

- Roads
- Trails
- Streams
- Strouds Run State Park

**Shallow Soils (ng/kg) PPT**

- ND (< 150)
- > ND - 1,000
- > 1,000 - 5,000
- > 5,000 - 10,000
- > 10,000

**Surface Water (ng/L) PPT**

- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Drinking Water (ng/L) PPT**

- ND (< 1.5)
- > ND - 10
- > 10 - 70
- > 70 - 500
- > 500 - 1,000
- > 1,000

**Groundwater (ng/L) PPT**

- ▲ ND (< 5)
- ▲ > ND - 10
- ▲ > 10 - 70
- ▲ > 70 - 500
- ▲ > 500 - 1,000
- ▲ > 1,000

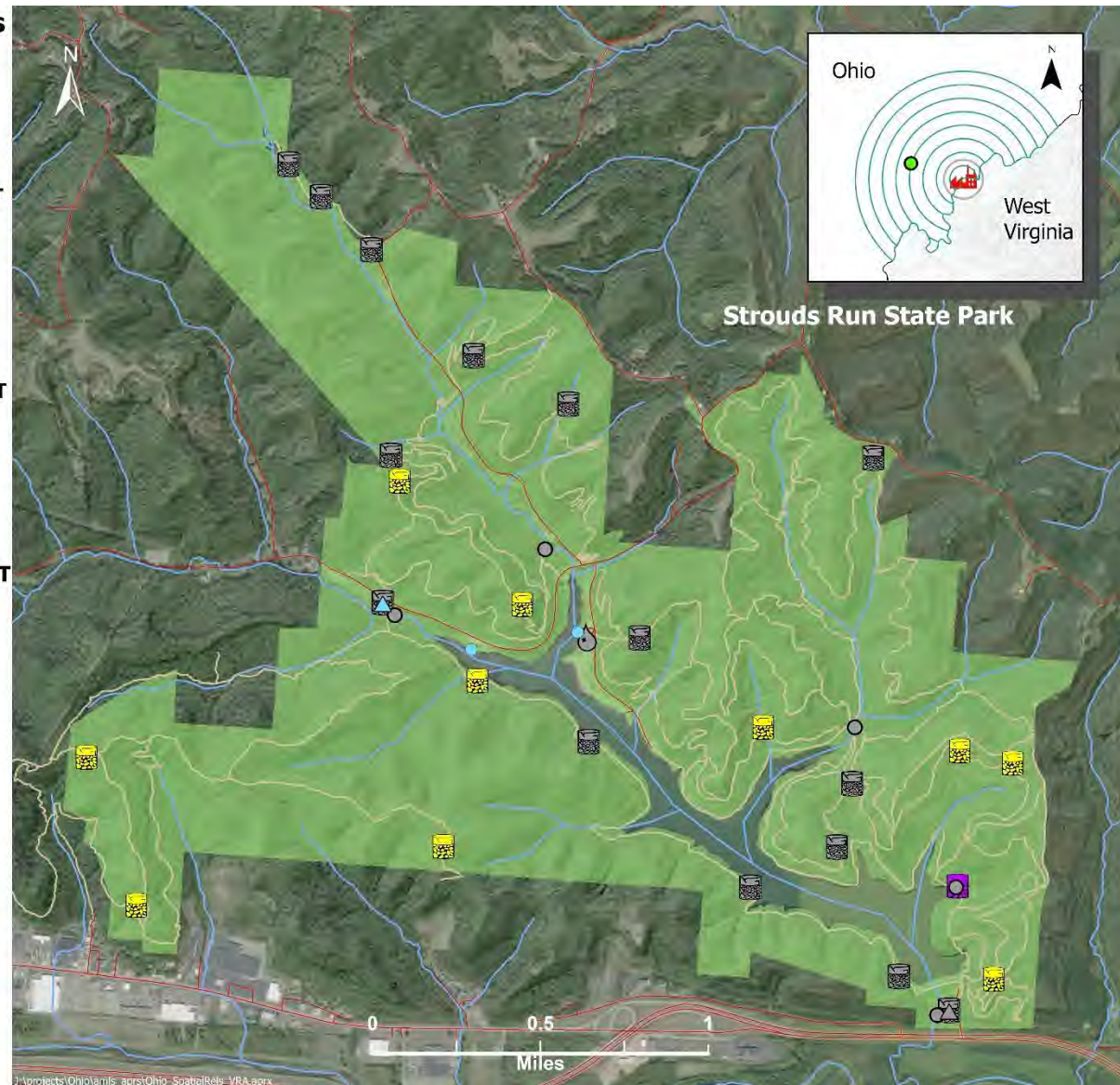




Figure 24. Map of PFOA concentrations for samples of all media types collected in Burr Oak State Park.

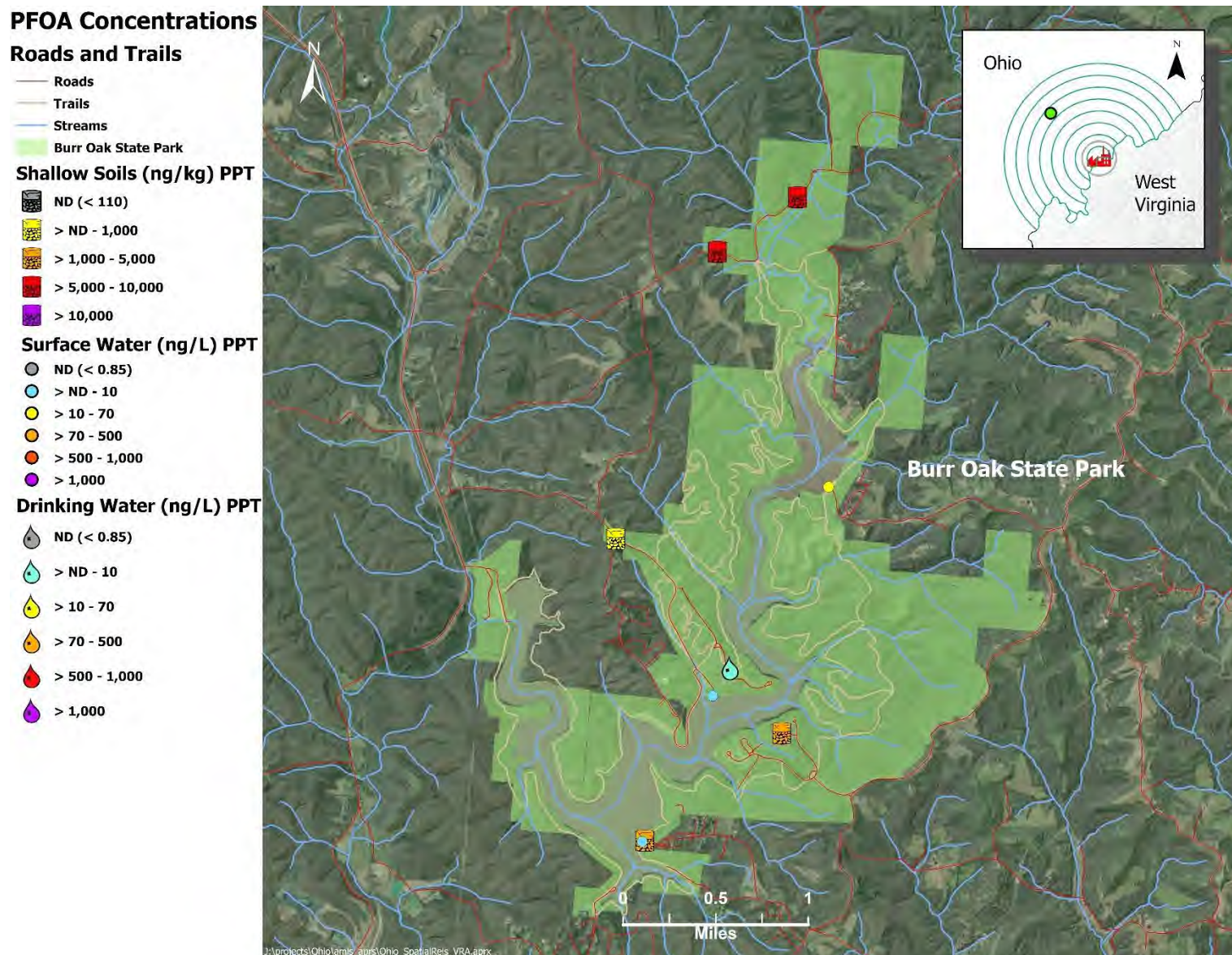
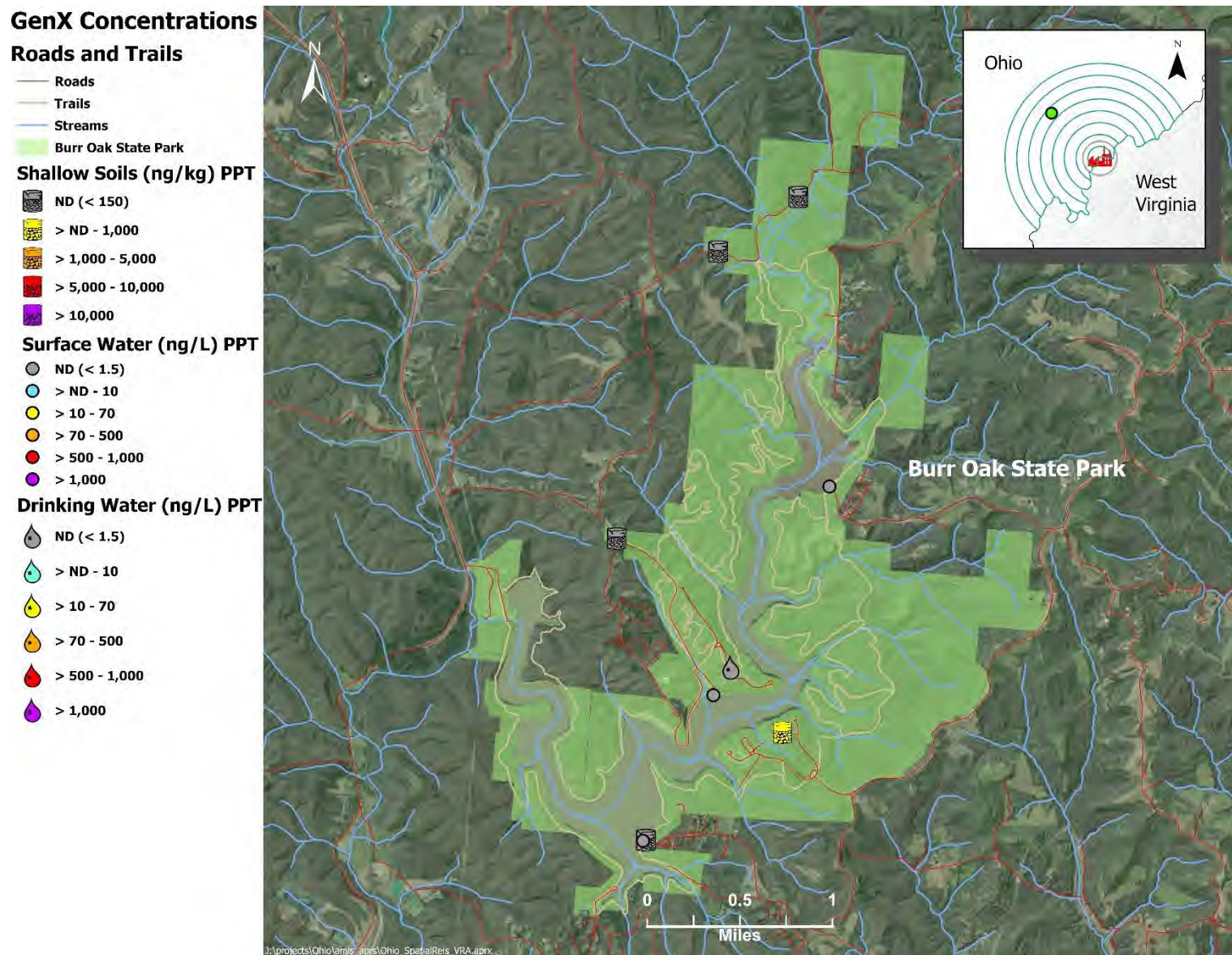




Figure 25. Map of GenX concentrations for samples of all media types collected in Burr Oak State Park.



**Table 14. Shallow soil, surface water, groundwater, and drinking water samples collected from Strouds Run State Park**

Site ID	Distance from Facility (miles)	PFOA	GenX
<b>Shallow soil</b>			
S424	20.8	220	ND
S425	18.9	2,800	ND
S390	20.4	5,800	220
S391	20.0	1,500	170
S391	20.0	1,500	ND
S392	20.4	6,600	140
S392	20.4	7,000	140
S393	21.3	5,000	250
S394	20.5	5,800	150
S395	20.1	6,600	ND
S396	19.5	7,400	ND
S397	18.9	5,500	210
S398	20.9	5,900	ND
S399	19.3	5,400	ND
S400	18.8	4,300	150
S401	20.8	2,100	ND
S402	19.0	290	ND
S403	21.5	3,600	ND
S404	21.5	3,800	170
S405	21.4	2,000	ND
S406	20.9	4,800	240
S407	19.5	1,500	ND
S408	19.0	4,800	120
S409	19.3	3,600	ND
S410	21.2	2,300	ND
S411	18.9	1,600	16,000
S412	20.5	3,200	ND
S413	19.6	1,700	220
<b>Surface water</b>			
S411	18.9	20	ND
S414	18.9	23	ND
S416	19.4	63	ND
S417	20.2	22	2
S418	20.5	22	1.7
S419	20.4	5.6	ND
S420	20.8	44	ND
<b>Groundwater</b>			
S424	20.8	35	6.1
S425	18.9	18	ND
<b>Drinking water</b>			
S422	20.2	1.8	ND
S422	20.2	1.8	ND

**Table 15. Shallow soil, surface water, and drinking water samples collected from Burr Oak State Park**

Site ID	Distance from Facility (miles)	PFOA	GenX
<b>Shallow soil</b>		<b>ng/kg</b>	<b>ng/kg</b>
S426	28.3	7,500	ND
S427	28.3	5,100	ND
S428	27.6	990	ND
S429	26.4	5,000	ND
S430	26.2	2,700	780
<b>Surface water</b>		<b>ng/L</b>	<b>ng/L</b>
S431	26.4	9.7	ND
S432	26.6	9.5	ND
S433	27.0	11	ND
<b>Drinking water</b>		<b>ng/L</b>	<b>ng/L</b>
S434	26.7	1.8	ND

### 5.3.2 Other State Lands

As part of our objective to characterize the spatial extent of PFOA, GenX, and other PFAS contamination within our study area, we collected shallow soil, surface water, and (when available) drinking water samples from State lands 20–40 miles from the Facility. Overall, we detected PFOA in both shallow soil and surface water in every State land sampled (Table 16). For drinking water, elevated PFOA concentrations (20 ng/L) were detected in the sample collected from the drinking water source at Muskingum River State Park Lock 4. All other drinking water sample concentrations were below 5 ng/L PFOA.

As discussed in Section 5.1, GenX concentrations were low to non-detected for many of the samples collected beyond 20 miles from the Facility (Table 17). As with PFOA concentrations, GenX concentrations (7.8 ng/L) in the drinking water collected from the Muskingum River State Park Lock 4 drinking water source were elevated relative to the other samples.

### 5.3.3 Canopy Study

PFAS concentrations for all soil, plant tissue, and plant rinsate samples are provided in the Access Database (Appendix I). The three site IDs associated with this study are 384, 385, and 386 (Figure 9). More details on PFOA and GenX concentrations in soil, plant tissue, and plant rinsate samples are provided in the following sections.

#### Shallow Soils

PFOA concentrations in soil were 1.5–2 times higher in samples collected under deciduous canopy (7,700–9,700 ng/kg) and more than 4 times higher in samples collected under pine canopy (16,000 ng/kg), compared to concentrations in soil samples collected in open areas (3,600–5,600 ng/kg). PFOA concentrations in soil samples collected from the edge locations were similar to soil samples collected under deciduous canopy at sites S384 (6,900 ng/kg) and S386 (9,700 ng/kg). Edge PFOA soil concentrations were slightly lower than the open area sample at site S385 (4,400 ng/kg versus 5,500 ng/L; Figure 26, Table 18).



**Table 16. Summary statistics for shallow soil, surface water, and drinking water PFOA concentrations in samples collected in State lands sampled in 2019 under Objective 1**

State land	Distance from Facility <sup>a</sup> (miles)	Shallow soil				Surface water				Drinking water			
		Number samples	Minimum (ng/kg)	Maximum (ng/kg)	Average <sup>b</sup> (ng/kg)	Number samples	Minimum (ng/L)	Maximum (ng/L)	Average <sup>b</sup> (ng/L)	Number samples	Minimum (ng/L)	Maximum (ng/L)	Average <sup>b</sup> (ng/L)
Muskingum River State Park Lock 4	19	0				0				1	20	20	20
Muskingum River State Park Lock 6	20	1	1,900	1,900	1,900	1	4.8	4.8	4.8				
Muskingum River State Park Lock 7	26	1	940	940	940	0				0			
Wolf Creek Wildlife Area	24	1	3,200	3,200	3,200	1	12	12	12	0			
Fox Lake Wildlife Area	28	2	2,000	2,200	2,100	1	9.7	9.7	9.7	0			
Wallace H. O'Dowd Wildlife Area	30–35	3	1,500	3,200	2,333	1	47	47	47	0			
Ale's Run Wildlife Area	30	2	4,400	8,600	6,500	0				0			
Waterloo Wildlife Area	32	1	230	230	230	3	3.6	5.4	5.0	0			
Zaleski State Forest	34	3	1,200	2,500	1,800	3	5.0	6.8	6.0	0			
Wolf Run State Park	37	1	5,600	5,600	5,600	1	16	16	16	1	4.3	4.3	4.3
Lake Hope State Park	37	1	970	970	970	1	5.5	5.5	5.5	1	2	2	2
Blue Rock State Park	39	1	3,100	3,100	3,100	1	20	20	20	1	2.9	2.9	2.9
Vinton Furnace State Forest	39	1	180	180	180	1	4.0	4.0	4.0	0			
Samuels Wildlife Area	40	1	1,400	1,400	1,400	1	11	11	11	0			

a. Range represents the range of distances from the Facility for all samples collected within the State land.

b. For averaging, samples with concentrations below the detection limit (i.e., ND) were set to a concentration of zero.

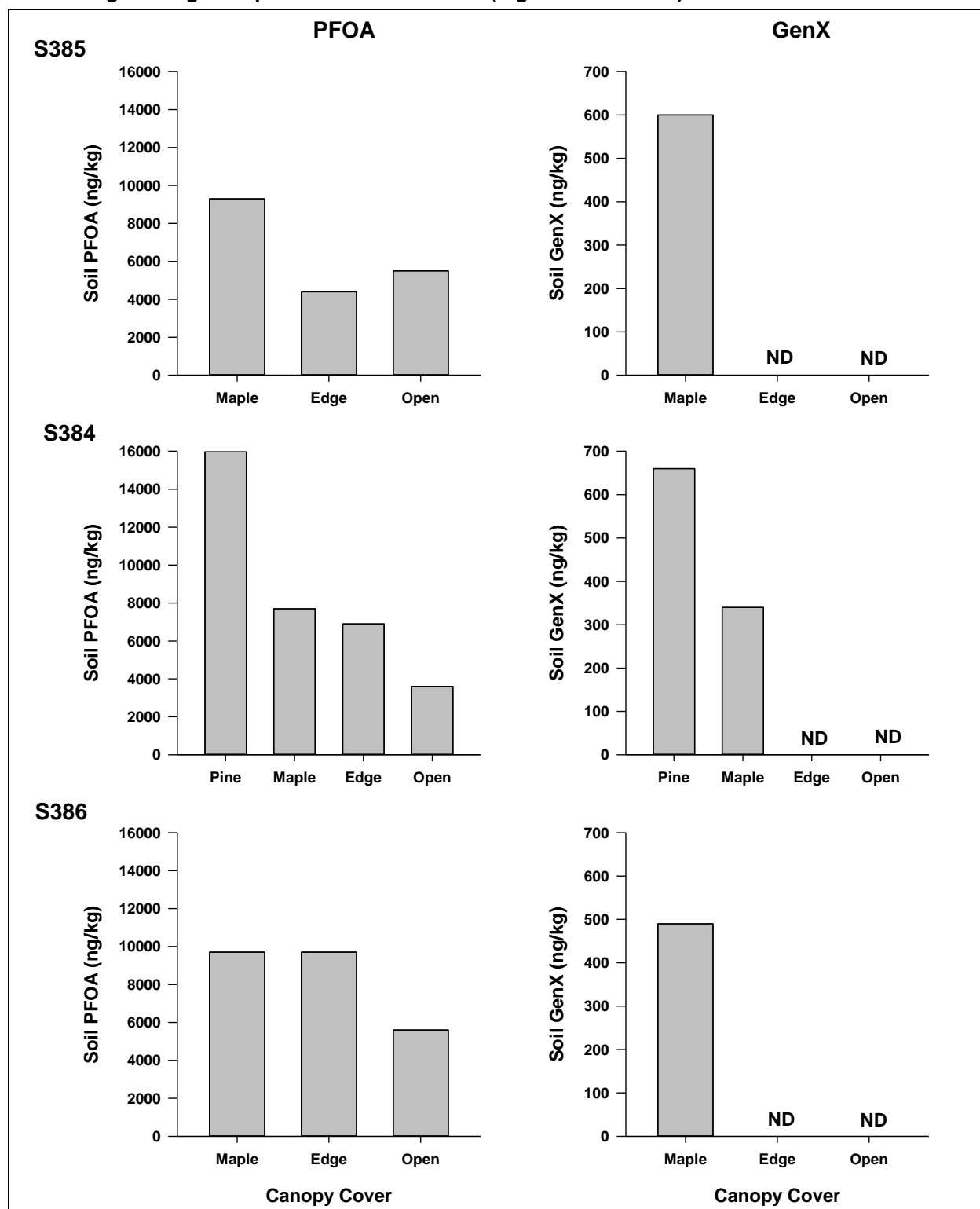
**Table 17. Summary statistics for shallow soil, surface water, and drinking water GenX concentrations in samples collected in State lands sampled in 2019 under Objective 1**

State land	Distance from Facility <sup>a</sup> (miles)	Shallow soil				Surface water				Drinking water			
		Number samples	Minimum (ng/kg)	Maximum (ng/kg)	Average <sup>b</sup> (ng/kg)	Number samples	Minimum (ng/L)	Maximum (ng/L)	Average <sup>b</sup> (ng/L)	Number samples	Minimum (ng/L)	Maximum (ng/L)	Average <sup>b</sup> (ng/L)
Muskingum River State Park Lock 4	19	0				0				1	7.8	7.8	7.8
Muskingum River State Park Lock 6	20	1	ND	ND	ND	1	ND	ND	ND				
Muskingum River State Park Lock 7	26	1	ND	ND	ND	0				0			
Wolf Creek Wildlife Area	24	1	ND	ND	ND	1	ND	ND	ND	0			
Fox Lake Wildlife Area	28	2	ND	ND	ND	1	ND	ND	ND	0			
Wallace H. O'Dowd Wildlife Area	30–35	3	ND	ND	ND	1	ND	ND	ND	0			
Ale's Run Wildlife Area	30	2	220	350	285	0				0			
Waterloo Wildlife Area	32	1	ND	ND	ND	3	ND	ND	ND	0			
Zaleski State Forest	34	3	ND	ND	ND	3	ND	ND	ND	0			
Wolf Run State Park	37	1	ND	ND	ND	1	1.5	1.5	1.5	1	1.9	1.9	1.9
Lake Hope State Park	37	1	ND	ND	ND	1	ND	ND	ND	1	ND	ND	ND
Blue Rock State Park	39	1	210	210	210	1	2.1	2.1	2.1	1	2.6	2.6	2.6
Vinton Furnace State Forest	39	1	ND	ND	ND	1	ND	ND	ND	0			
Samuels Wildlife Area	40	1	ND	ND	ND	1	ND	ND	ND	0			

a. Range represents the range of distances from the Facility for all samples collected within the State land.

b. For averaging, samples with concentrations below the detection limit (i.e., ND) were set to a concentration of zero.

Figure 26. PFOA and GenX concentrations in soil collected under tree canopy, in open areas, and along the edge of open and forested areas (Figures 9B and 11).





**Table 18. PFOA and GenX concentrations in shallow soil samples collected as part of the canopy study.** Site numbers arranged in order from north to south (Figure 9).

Site ID	Canopy cover	Sample ID	PFOA (ng/L)	GenX (ng/L)
S385	Open	190917-S385-SL-03	5,500	ND
	Edge	190917-S385-SL-02	4,400	ND
	Deciduous	190917-S385-SL-01	9,300	600
S384	Open	190917-S384-SL-03	3,600	ND
	Edge	190917-S384-SL-02	6,900	ND
	Deciduous	190917-S384-SL-01	7,700	340
	Pine	190917-S384-SL-04	16,000	660
S386	Open	190917-S386-SL-03	5,600	ND
	Edge	190917-S386-SL-02	9,700	ND
	Deciduous	190917-S386-SL-01	9,700	490

GenX concentrations in soil samples collected in open or edge areas were below detection limits (< 120–140 ng/kg). Concentrations in soil samples beneath deciduous canopy ranged from 340 to 600 ng/kg, and the concentration in soil beneath the pine canopy was 660 ng/kg (Figure 26, Table 18).

### Plant Tissue and Rinsate Samples

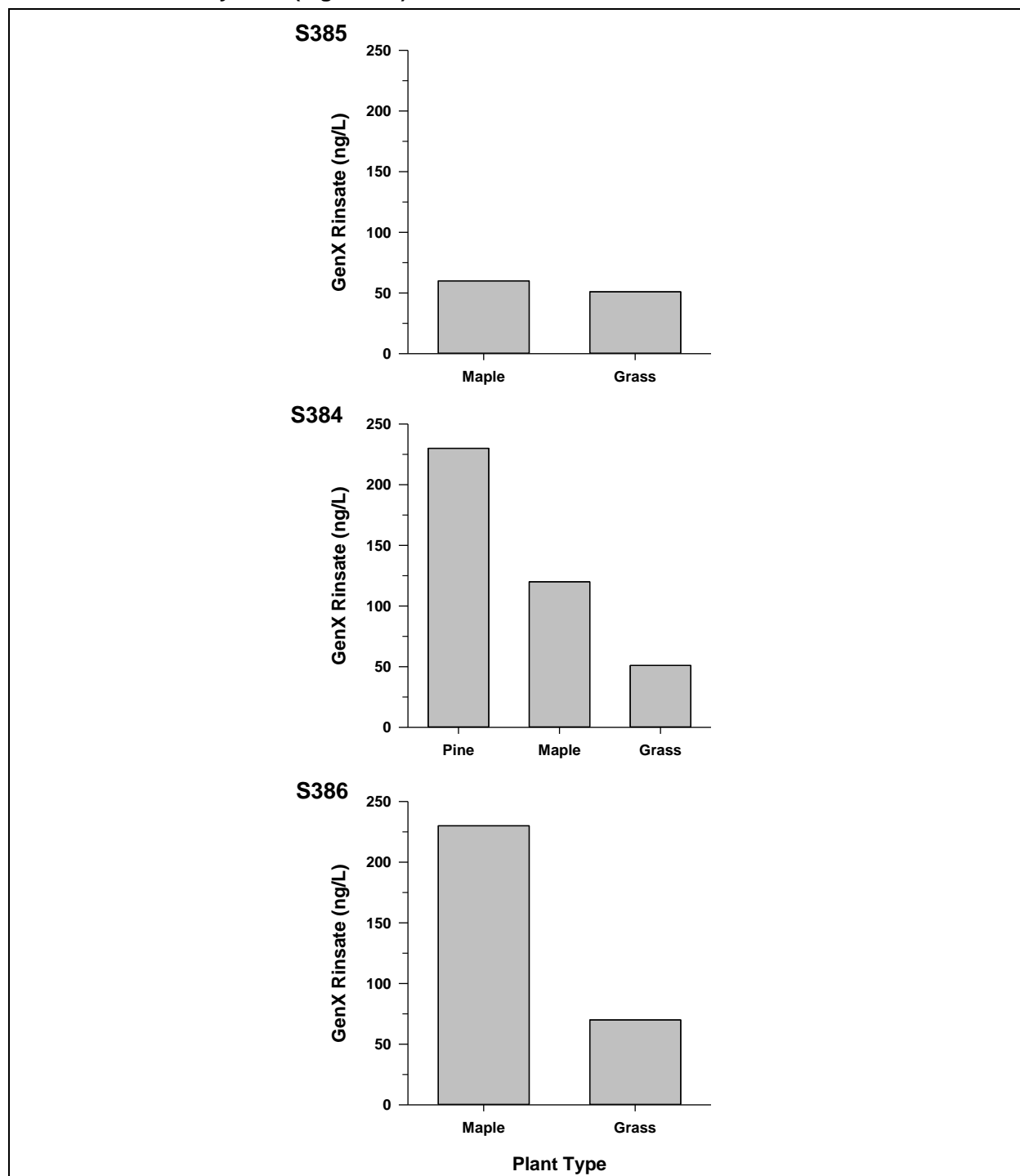
PFOA concentrations were below detection limits in all plant tissue samples. GenX was detected in unrinsed and rinsed leaves, unrinsed pine needles, and unrinsed grass clippings. Many plant tissue samples had GenX concentrations below detection limits (Table 19).

**Table 19. PFOA and GenX concentrations in plant tissue.** Rinsed tissue was rinsed in 250 mL of PFAS-free water for 5 minutes (see Table 20 for rinsate concentrations). Site numbers are arranged in order from north to south (Figure 9).

Site ID	Canopy cover	Plant tissue	Rinsed or unrinsed	Sample ID	Mass (g)	PFOA (ng/kg)	GenX (ng/kg)
S385	Open	Grass	Unrinsed	190917-S385-PT-06	17	ND	ND
	Open	Grass	Rinsed	190917-S385-PT-07	18.2	ND	ND
	Deciduous	Leaves	Unrinsed	190917-S385-PT-04	19.5	ND	ND
	Deciduous	Leaves	Rinsed	190917-S385-PT-05	20.4	ND	ND
S384	Open	Grass	Unrinsed	190917-S384-PT-08	29.1	ND	ND
	Open	Grass	Rinsed	190917-S384-PT-12	23.1	ND	ND
	Deciduous	Leaves	Unrinsed	190917-S384-PT-05	24.5	ND	5,500
	Deciduous	Leaves	Rinsed	190917-S384-PT-06	25.1	ND	4,900
	Pine	Needles	Unrinsed	190917-S384-PT-09	27.6	ND	1,500
	Pine	Needles	Rinsed	190917-S384-PT-10	31.8	ND	ND
S386	Open	Grass	Unrinsed	190917-S386-PT-06	24.6	ND	1,700
	Open	Grass	Rinsed	190917-S386-PT-07	28.5	ND	ND
	Deciduous	Leaves	Unrinsed	190917-S386-PT-04	18.4	ND	ND
	Deciduous	Leaves	Rinsed	190917-S386-PT-05	23.2	ND	1,400

PFOA concentrations were below detection limits in all plant rinsate samples. GenX concentrations were detected in all plant rinsate samples from tree leaves, pine needles, and grass clippings. GenX concentrations in leaf rinsate ranged from 60 to 230 ng/L, the pine needle rinsate concentration was 230 ng/L, and the concentrations in grass rinsate ranged from 51 to 70 ng/L (Figure 27, Table 20).

**Figure 27. GenX concentrations in rinsate from leaves, pine needles, and grass collected at three different study sites (Figure 9B).**



**Table 20. PFOA and GenX concentrations in plant tissue rinsate samples.** Tissue was rinsed in 250 mL of PFAS-free water for 5 minutes. Site numbers are arranged in order from north to south (Figure 9).

Site ID	Canopy cover	Plant tissue	Sample ID	Mass rinsed (g)	PFOA (ng/L)	GenX (ng/L)
S385	Open	Grass	190917-S385-PR-09	18.2	ND	51
	Deciduous	Leaves	190917-S385-PR-08	20.4	ND	60
S384	Open	Grass	190917-S384-PR-13	23.1	ND	51
	Deciduous	Leaves	190917-S384-PR-07	25.1	ND	120
	Pine	Needles	190917-S384-PR-11	31.8	ND	230
S386	Open	Grass	190917-S386-PR-09	28.5	ND	70
	Deciduous	Leaves	190917-S386-PR-08	23.2	ND	230

## References

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## A. Data Tables

**Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples**

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Objective 1																			
R100	1	State Rte 124	Washington	1.3	9/18	39.264796	-81.697812	190918-R100-SL-01	4,300	2,300	270	200	190	160	250	280	410	ND	890
R101	2	State Rte 144	Athens	7.9	9/18	39.267241	-81.821738	190918-R101-SL-02	3,400	ND	ND	ND	100	78	89	97	130	ND	ND
R102	3	Co Rd 66	Athens	12.4	9/18	39.260824	-81.906783	190918-R102-SL-02	3,000	140	200	110	160	110	110	ND	74	ND	680
R103	4	State Rte 681	Meigs	16.3	9/16	39.169784	-81.950589	191609-R103-SL-07	440	140	ND	ND	78	53	76	67	81	ND	550
R104	5	State Rte 681	Meigs	23.5	9/16	39.169027	-82.092921	191609-R104-SL-04	770	140	220	ND	96	72	74	33	ND	ND	ND
R105	6	State Rte 681	Meigs	25.0	9/16	39.178021	-82.12505	191609-R105-SL-02	4,000	ND	390	150	280	160	180	68	110	ND	670
R106	7	State Rte 325	Meigs	33.2	9/17	39.03839	-82.216765	190917-R106-SL-02	760	ND	200	100	90	69	130	51	100	ND	350
R107	8	State Rte 160	Vinton	39.3	9/17	39.157739	-82.392436	190917-R107-SL-02	140	ND	110	ND	46	ND	ND	ND	ND	ND	580
R108	9	State Rte 618	Washington	2.0	9/17	39.278021	-81.639811	190917-R108-SL-02	7,900	2,300	570	410	250	240	650	980	1200	ND	2,100
R109	11	Dragstrip Rd	Washington	2.7	9/16	39.299711	-81.643235	190916-R109-SL-01	4,600	510	210	100	110	71	120	140	190	ND	560
R110	12	State Rte 339	Washington	2.0	9/17	39.297613	-81.663519	190917-R110-SL-02	6,300	3,300	600	340	230	230	550	710	1500	ND	290
R111	13	Short Brook Rd	Washington	2.5	9/16	39.304564	-81.685725	190916-R111-SL-01	1,600	590	140	120	100	78	170	180	210	ND	330
R112	15	Cave Hill Rd	Washington	4.0	9/16	39.306174	-81.732412	190916-R112-SL-03	2,900	610	350	160	340	150	170	190	190	ND	940
R113	16	State Rte 124	Washington	1.7	9/18	39.254247	-81.699183	190918-R113-SL-02	4,400	1,100	420	340	230	180	430	620	400	ND	680
R114	17	State Rte 555	Washington	2.0	9/18	39.276266	-81.711125	190918-R114-SL-03	2,500	340	240	120	150	96	200	270	340	ND	480
R115	18	Congress Rd	Washington	5.3	9/17	39.284783	-81.578333	190917-R115-SL-02	1,300	610	240	ND	76	85	160	150	210	ND	490
R116	20	Twp Rd 40	Washington	5.0	9/16	39.317397	-81.603624	190916-R116-SL-01	2,300	330	ND	ND	58	48	54	49	96	ND	ND
R117	21	State Rte 550	Washington	8.8	9/16	39.394062	-81.636745	190916-R117-SL-01	2,500	ND	1,000	ND	ND	ND	250	310	520	ND	1,200
R118	22	State Rte 550	Washington	9.3	9/16	39.402032	-81.705768	190916-R118-SL-01	620	ND	ND	ND	58	40	60	53	64	ND	530
R119	23	State Rte 124	Meigs	9.6	9/16	39.141958	-81.745701	191609-R119-SL-10	7,000	180	370	200	240	250	240	270	260	ND	520
R120	24	State Rte 555	Washington	5.4	9/16	39.316666	-81.755624	190916-R120-SL-02	680	160	ND	ND	ND	ND	ND	ND	42	ND	ND
R121	25	State Rte 144	Athens	7.4	9/18	39.212098	-81.791586	190918-R121-SL-02	470	ND	ND	ND	ND	44	70	48	87	ND	ND
R122	26	State Rte 144	Athens	9.7	9/19	39.302529	-81.850144	190919-R122-SL-02	680	ND	ND	ND	ND	30	45	53	52	ND	ND
R122	26	State Rte 144	Athens	9.7	9/19	39.302529	-81.850144	190919-R122-SL-03	810	ND	ND	ND	ND	ND	54	65	70	ND	420
R123	27	State Rte 550	Washington	12.6	9/19	39.405079	-81.517802	190919-R123-SL-01	1,500	750	350	140	150	120	120	120	140	38	500
R124	28	State Rte 339	Washington	14.7	9/16	39.479977	-81.631241	190916-R124-SL-01	590	ND	500	ND	ND	ND	ND	ND	63	ND	220
R125	29	State Rte 550	Washington	10.6	9/16	39.403937	-81.771438	190916-R125-SL-01	670	130	ND	ND	42	34	85	78	110	ND	360
R126	30	State Rte 248	Meigs	14.1	9/16	39.089755	-81.799935	191609-R126-SL-15	530	ND	83	ND	ND	ND	41	ND	ND	ND	ND
R127	31	State Rte 550	Washington	13.8	9/16	39.424813	-81.838335	190916-R127-SL-01	7,700	ND	300	160	300	220	110	28	ND	ND	280
R128	32	State Rte 248	Meigs	14.9	9/16	39.105516	-81.855448	191609-R128-SL-13	2,800	9,100	210	94	150	97	130	140	140	ND	450
R129	33	State Rte 144	Athens	11.8	9/19	39.30796	-81.88985	190919-R129-SL-02	400	ND	ND	ND	83	51	63	66	70	47	520

Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
R130	34	Sheets Run Rd	Washington	18.8	9/19	39.362437	-81.345226	190919-R130-SL-02	560	ND	ND	ND	ND	ND	58	ND	ND	ND	ND
R131	35	State Rte 60	Washington	17.1	9/19	39.452112	-81.459026	190919-R131-SL-01	6,300	220	330	250	350	240	290	180	180	72	6,500
R132	36	State Rte 339	Washington	18.0	9/16	39.530356	-81.653896	190916-R132-SL-01	1,800	ND	180	ND	110	69	110	61	71	ND	380
R133	37	State Rte 266	Morgan	18.8	9/19	39.536614	-81.749509	190919-R133-SL-02	1,100	ND	49	ND	68	52	100	69	99	ND	560
R134	38	State Rte 124	Meigs	16.8	9/16	39.048811	-81.804937	191609-R134-SL-17	3,300	ND	360	150	240	150	120	89	91	ND	530
R135	39	State Rte 676	Washington	15.4	9/16	39.462645	-81.820851	190916-R135-SL-01	4,100	ND	170	95	160	140	76	ND	ND	ND	ND
R136	40	State Rte 248	Meigs	18.4	9/17	39.087497	-81.925553	190917-R136-SL-02	3,300	ND	ND	ND	120	120	140	79	87	ND	1,200
R137	41	State Rte 690	Athens	18.6	9/18	39.38221	-81.991597	190918-R137-SL-01	520	ND	ND	ND	ND	43	61	35	70	ND	ND
R138	42	Twp Rd 19	Washington	23.7	9/19	39.403005	-81.267621	190919-R138-SL-02	810	ND	ND	ND	62	ND	86	61	100	ND	480
R139	43	State Rte 26	Washington	23.9	9/19	39.473736	-81.314486	190919-R139-SL-01	470	ND	76	ND	46	ND	66	47	71	ND	610
R140	44	State Rte 60	Washington	20.6	9/19	39.554234	-81.554444	190919-R140-SL-01	250	ND	48	ND	ND	30	54	62	91	ND	970
R141	45	State Rte 60	Morgan	23.0	9/19	39.602686	-81.715411	190919-R141-SL-02	950	ND	200	ND	ND	67	71	37	54	ND	ND
R142	46	State Rte 124	Meigs	20.2	9/17	38.989351	-81.780204	190917-R142-SL-01	120	190	ND	ND	ND	ND	ND	ND	ND	160	ND
R143	47	State Rte 329	Morgan	22.9	9/18	39.472989	-82.014736	190918-R143-SL-01	5,300	ND	330	170	290	210	100	28	ND	ND	270
R144	48	State Rte 7a	Meigs	23.1	9/17	39.04114	-81.98957	190917-R144-SL-02	5,300	ND	340	180	260	320	190	91	180	ND	500
R145	49	State Rte 682	Athens	23.2	9/18	39.318574	-82.103876	190918-R145-SL-01	2,900	ND	240	120	170	130	180	75	110	ND	550
R146	50	Co Rd 25	Washington	25.9	9/19	39.423987	-81.234142	190919-R146-SL-01	3,700	ND	540	250	280	230	230	140	140	30	1,100
R147	51	State Rte 145	Noble	29.7	9/18	39.622333	-81.355991	190918-R147-SL-02	3,200	ND	360	140	170	140	170	100	130	ND	570
R148	52	State Rte 821	Washington	27.1	9/18	39.614439	-81.429451	190918-R148-SL-02	4,500	ND	270	120	190	150	140	66	91	ND	380
R149	53	State Rte 78	Morgan	29.6	9/19	39.69199	-81.771747	190919-R149-SL-02	2,400	ND	220	97	170	150	93	55	79	ND	430
R150	54	State Rte 124	Meigs	25.6	9/17	38.923427	-81.847247	190917-R150-SL-02	110	ND	ND	ND	ND	ND	ND	27	75	ND	320
R151	55	State Rte 13	Athens	26.1	9/18	39.459804	-82.095987	190918-R151-SL-01	310	ND	130	ND	62	48	58	ND	78	ND	680
R152	56	State Rte 124	Meigs	28.1	9/17	39.02899	-82.09645	190917-R152-SL-02	150	ND	120	ND	ND	48	51	77	68	ND	380
R153	57	State Rte 13	Athens	26.0	9/18	39.449347	-82.102109	190918-R153-SL-01	1,700	ND	220	110	130	100	92	40	78	ND	ND
R154	58	State Rte 7	Washington	31.4	9/19	39.448531	-81.134673	190919-R154-SL-01	2,000	ND	230	90	130	120	120	79	110	ND	780
R155	59	State Rte 260	Monroe	34.6	9/18	39.629968	-81.225378	190918-R155-SL-02	3,000	ND	310	98	170	130	180	71	100	ND	620
R156	60	State Rte 78	Noble	32.8	9/18	39.738839	-81.570906	190918-R156-SL-02	11,000	250	700	300	380	430	280	140	140	55	760
R157	61	State Rte 376	Morgan	32.3	9/19	39.718656	-81.850569	190919-R157-SL-02	890	ND	110	ND	120	110	180	100	96	ND	450
R158	62	State Rte 78	Hocking	30.6	9/18	39.495617	-82.166918	190918-R158-SL-01	450	ND	250	ND	ND	89	140	78	120	ND	500
R159	63	State Rte 554	Gallia	32.1	9/17	38.980401	-82.142178	190917-R159-SL-02	610	ND	290	ND	56	69	250	120	150	ND	650
R160	64	State Rte 681	Athens	30.3	9/18	39.28047	-82.24091	190918-R160-SL-02	970	ND	210	ND	66	84	110	65	130	ND	720
R161	65	State Rte 260	Monroe	35.0	9/18	39.665929	-81.265484	190918-R161-SL-02	2,000	ND	450	170	190	150	130	75	110	ND	780
R162	67	State Rte 78	Noble	36.8	9/18	39.774492	-81.450612	190918-R162-SL-01	5,100	120	380	120	230	180	150	82	97	ND	250
R163	68	State Rte 376	Muskingum	36.7	9/19	39.784344	-81.853482	190919-R163-SL-02	1,400	ND	140	ND	74	110	260	240	300	ND	830

Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
R164	69	State Rte 555	Morgan	37.5	9/19	39.739358	-82.027571	190919-R164-SL-03	210	ND	130	ND	ND	ND	ND	ND	ND	ND	ND
R164	69	State Rte 555	Morgan	37.5	9/19	39.739358	-82.027571	190919-R164-SL-04	250	ND	150	ND	ND	ND	45	ND	ND	ND	ND
R165	70	State Rte 7	Gallia	36.8	9/17	38.882648	-82.146838	190917-R165-SL-02	1,100	ND	170	ND	92	61	130	69	92	ND	590
R166	71	State Rte 278	Vinton	36.9	9/18	39.312323	-82.361124	190918-R166-SL-02	370	ND	ND	ND	ND	51	150	86	110	ND	660
R167	7	Gambill Hollow Rd	Vinton	34.5	9/17	39.255548	-82.317906	190917-R167-SL-02	1,700	ND	440	130	170	120	170	70	110	ND	1,200
R168	8	Runyon Rd	Vinton	39.2	9/17	39.1664	-82.392881	190917-R168-SL-02	180	ND	260	ND	ND	45	99	49	77	38	800
R169	8	Pearl McKibben Rd	Vinton	36.8	9/17	39.2607	-82.360659	190917-R169-SL-02	2,500	ND	410	160	260	250	120	35	58	52	700
R170	45	Muskingum River State Park Lock 6	Morgan	20.0	9/19	39.546716	-81.787999	190919-R170-SL-02	1,900	ND	120	89	150	120	60	ND	ND	ND	650
R171	47	S. Elliott Rd	Morgan	23.7	9/17	39.555351	-81.921236	190917-R171-SL-01	3,200	ND	250	ND	200	170	130	89	110	ND	660
R172	51	Twp Rd 271	Noble	30.0	9/18	39.63844	-81.377314	190918-R172-SL-01	4,400	350	250	ND	160	150	200	130	230	45	350
R173	53	State Rte 376	Morgan	26.6	9/19	39.63462	-81.83648	190919-R173-SL-01	940	ND	130	120	180	150	200	220	170	70	3,100
R174	55	Hunterdon Rd	Athens	29.6	9/18	39.51671	-82.126709	190918-R174-SL-01	2,300	ND	1200	200	160	190	300	140	180	ND	840
R175	57	Fox Lake Boat Ramp Area	Athens	28.0	9/18	39.296444	-82.196822	190918-R175-SL-02	2,000	ND	270	130	170	130	160	69	100	64	910
R175	57	Fox Lake Boat Ramp Area	Athens	28.0	9/18	39.296444	-82.196822	190918-R175-SL-03	2,200	ND	250	140	160	160	140	67	89	39	890
R176	60	Co Rd 42	Noble	30.7	9/18	39.662926	-81.406808	190918-R176-SL-01	8,600	220	610	290	430	470	190	150	110	ND	490
R177	62	State Rte 216	Hocking	33.9	9/18	39.548174	-82.196732	190918-R177-SL-01	3,200	ND	520	210	250	230	150	61	110	ND	1,800
R178	64	Boat Ramp Area of small lake	Athens	31.7	9/18	39.345551	-82.257726	190918-R178-SL-04	230	ND	94	ND	ND	32	95	99	140	ND	620
R179	67	Wolf Run Boat Ramp Area	Noble	36.8	9/18	39.793524	-81.541876	190918-R179-SL-02	5,600	ND	390	180	300	290	82	45	39	56	780
R180	68	Blue Rock Boat Ramp Area	Muskingum	38.9	9/19	39.8186	-81.848007	190919-R180-SL-02	3,100	210	520	270	240	370	180	72	75	ND	540
R181	69	Sand Run-New Straitsville Rd	Hocking	35.1	9/18	39.548134	-82.224858	190918-R181-SL-01	1,500	ND	450	170	160	130	160	70	140	ND	1,100
R182	70	State Rte 160	Gallia	40.0	9/17	38.96639	-82.309544	190917-R182-SL-02	1,400	ND	420	110	120	130	230	95	140	ND	650
R183	71	E Raccoon Rd	Vinton	38.3	9/17	39.287756	-82.388403	190917-R183-SL-02	1,200	ND	200	ND	160	140	130	51	79	52	2,000
R184	71	Lake Hope Boat Ramp Area	Vinton	36.7	9/18	39.320748	-82.356705	190918-R184-SL-02	970	ND	260	ND	96	92	110	55	110	ND	980



Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Objective 2																			
W200	48	Twp Hwy 126	Meigs	20.7	9/17	39.032319	-81.911473	190917-W200-SL-01	4,400	ND	620	260	350	320	190	70	69	47	890
W201	30	State Rte 124	Meigs	11.2	9/16	39.117719	-81.747503	191609-W201-SL-11	760	ND	ND	ND	88	59	130	150	180	27	1,200
W203	32	Twp Rd 312	Meigs	10.9	9/16	39.16808	-81.82939	191609-W203-SL-08	4,100	270	570	240	360	270	180	130	150	ND	970
W204	25	Co Rd 59	Athens	6.9	9/18	39.219435	-81.785314	190918-W204-SL-01	420	ND	ND	ND	44	31	ND	ND	ND	ND	ND
W205	2	W Belpre Pike Rd	Athens	6.4	9/18	39.231579	-81.783077	190918-W205-SL-01	1,000	ND	64	ND	ND	ND	ND	ND	ND	ND	ND
W206	2	Co Rd 58	Athens	7.0	9/18	39.232016	-81.796452	190918-W206-SL-01	15,000	580	960	600	610	540	260	350	230	ND	550
W207	16	Collins Rd	Washington	3.1	9/18	39.239345	-81.717593	190918-W207-SL-01	5,500	1800	530	300	210	170	340	390	430	ND	620
W208	16	Twp Rd 298	Washington	2.1	9/18	39.253181	-81.707099	190918-W208-SL-01	2,300	190	400	280	130	92	190	200	140	ND	280
W209	17	Twp Rd 282	Washington	0.8	9/18	39.271752	-81.690243	190918-W209-SL-01	20,000	380	350	180	280	370	260	180	220	ND	800
W210	17	Tower Rd	Washington	0.9	9/18	39.273617	-81.691088	190918-W210-SL-01	750	310	180	270	260	110	150	120	200	79	13,000
W210	17	Tower Rd	Washington	0.9	9/18	39.273617	-81.691088	190918-W210-SL-02	790	ND	ND	270	250	120	140	120	180	90	10,000
W211	9	Beach Dr	Washington	3.0	9/17	39.275578	-81.619151	190917-W211-SL-01	7,100	550	960	760	510	260	350	450	260	ND	2,400
W212	15	Fern Dr	Washington	1.6	9/18	39.283264	-81.700032	190918-W212-SL-01	3,600	1,000	250	140	120	100	250	230	290	ND	870
W213	11	Off ramp to US Hwy 50 at State Rte 339	Washington	1.5	9/16	39.286282	-81.656304	190916-W213-SL-01	17,000	5,200	1,000	600	410	420	1,100	1,800	3,100	ND	440
W214	26	Welch Rd	Washington	5.3	9/16	39.303897	-81.764078	190916-W214-SL-01	4,500	440	410	460	320	170	170	170	110	ND	410
W215	12	State Rte 339	Washington	2.8	9/17	39.309948	-81.663135	190917-W215-SL-01	4,200	560	260	160	120	96	220	270	240	ND	ND
W216	33	Co Rd 109	Athens	10.3	9/19	39.312322	-81.859385	190919-W216-SL-01	3,400	ND	420	ND	220	120	130	84	79	ND	ND
W216	33	Co Rd 109	Athens	10.3	9/19	39.312322	-81.859385	190919-W216-SL-02	3,200	ND	410	ND	220	120	110	76	74	ND	ND
W217	11	Braun Rd	Washington	4.2	9/17	39.314808	-81.622523	190917-W217-SL-01	12,000	280	430	240	420	430	150	100	91	ND	ND
W218	13	Moody Ridge Rd	Washington	3.1	9/17	39.314521	-81.67732	190917-W218-SL-01	3,700	2,500	290	230	210	160	330	510	580	110	720
W219	24	Turkey Hollow Rd	Washington	6.9	9/16	39.325202	-81.783284	190916-W219-SL-01	5,100	350	360	250	300	170	250	220	210	ND	750
W220	26	Co Rd 3	Washington	9.9	9/19	39.328296	-81.844194	190919-W220-SL-01	12,000	ND	480	ND	590	550	180	91	76	ND	ND
W221	20	C3	Washington	8.2	9/16	39.347682	-81.558734	190916-W221-SL-01	640	110	ND	ND	ND	ND	ND	36	70	ND	ND
W222	21	Co Rd 2	Washington	6.9	9/16	39.361391	-81.624761	190916-W222-SL-01	2,500	1,100	180	ND	100	90	220	260	320	ND	710
W223	22	Darnold Rd	Washington	6.6	9/16	39.362233	-81.711162	190916-W223-SL-01	4,800	740	470	210	180	170	210	270	330	ND	650
W224	33	Felton Rd	Athens	14.4	9/18	39.370207	-81.910719	190918-W224-SL-01	5,900	300	430	190	160	150	220	170	270	ND	810
W226	31	Brill Rd	Athens	12.6	9/19	39.384607	-81.857767	190919-W226-SL-01	4,200	ND	700	310	540	350	130	65	74	ND	570
W227	27	Brush Rd	Washington	10.6	9/16	39.387157	-81.546574	190916-W227-SL-02	5,500	800	300	200	280	160	180	85	94	ND	410
W228	39	Sand Rock Rd	Athens	15.5	9/18	39.387638	-81.922195	190918-W228-SL-01	600	ND	41	ND	ND	37	110	77	120	ND	420

Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
W229	28	Ormiston Rd	Washington	11.0	9/16	39.424488	-81.625168	190916-W229-SL-01	2,500	740	600	320	210	140	290	270	210	ND	530
W230	29	Twp Rd 39	Washington	11.2	9/16	39.432459	-81.676745	190916-W230-SL-01	3,000	340	650	330	300	150	200	150	150	ND	310
W231	36	T108	Washington	15.2	9/16	39.489682	-81.644288	190916-W231-SL-01	3,800	ND	190	ND	130	120	220	160	190	ND	460
W232	36	Twp Rd 31	Washington	16.6	9/19	39.492611	-81.557352	190919-W232-SL-01	5,700	200	920	630	630	290	310	260	220	ND	610
W232	36	Twp Rd 31	Washington	16.6	9/19	39.492611	-81.557352	190919-W232-SL-02	5,400	180	800	560	550	260	270	230	200	ND	620
W233	35	Muskingum River Rd	Washington	18.5	9/19	39.495752	-81.487976	190919-W233-SL-01	13,000	ND	670	260	580	440	160	110	92	57	690
Objective 3																			
S311	12	Co Rd 3	Washington	5.0	9/18	39.340728	-81.659026	190918-S311-SL-01	3,300	1200	800	420	270	160	230	240	300	ND	870
S321	21	Twp Rd 268	Washington	6.2	9/18	39.358247	-81.65515	190918-S321-SL-01	23,000	ND	220	140	430	820	41	25	ND	ND	ND
S322	21	Twp Rd 268	Washington	5.3	9/18	39.343485	-81.648969	190918-S322-SL-01	880	ND	ND	ND	52	ND	ND	ND	ND	ND	ND
S324	3	Desonier Trail	Athens	10.8	9/17	39.232502	-81.870778	190917-S324-SL-01	13,000	280	810	340	720	610	150	110	110	ND	280
S325	3	Desonier Trail	Athens	10.7	9/17	39.235905	-81.86901	190917-S325-SL-01	13,000	300	480	280	520	460	170	69	71	27	270
S326	3	Desonier Trail	Athens	11.1	9/17	39.238445	-81.877606	190917-S326-SL-01	9,800	350	200	ND	130	73	180	94	89	ND	1,400
S326	3	Desonier Trail	Athens	11.1	9/17	39.238445	-81.877606	190917-S326-SL-02	11,000	520	190	ND	130	74	190	90	99	ND	340
S327	3	Desonier Trail	Athens	11.1	9/17	39.240276	-81.878297	190917-S327-SL-01	11,000	350	270	ND	210	210	130	67	71	ND	300
S328	3	Desonier Trail	Athens	10.6	9/17	39.238535	-81.868895	190917-S328-SL-01	290	ND	150	ND	74	34	ND	ND	ND	ND	2,700
S334	32	Number Nine Rd	Meigs	12.0	9/18	39.120194	-81.787433	190918-S334-SL-01	2,500	350	230	ND	91	140	170	200	440	ND	660
S335	30	Twp Hwy 278	Meigs	13.0	9/18	39.098278	-81.772723	190918-S335-SL-01	2,500	190	90	ND	59	80	100	56	120	ND	230
S336	30	Twp Hwy 277	Meigs	12.2	9/18	39.113374	-81.781521	190918-S336-SL-01	4,300	170	120	120	120	120	230	200	270	ND	720
S338	32	Success Rd	Meigs	13.3	9/19	39.112868	-81.818867	190919-S338-SL-01	8,600	450	390	ND	180	180	270	240	320	ND	680
S338	32	Success Rd	Meigs	13.3	9/19	39.112868	-81.818867	190919-S338-SL-02	8,400	520	420	ND	160	190	280	260	290	ND	710
S340	30	Twp Hwy 274	Meigs	13.0	9/18	39.094704	-81.765318	190918-S340-SL-01	5,800	190	460	220	300	290	120	79	91	ND	450
S341	30	Twp Hwy 277	Meigs	12.3	9/18	39.111262	-81.777894	190918-S341-SL-01	8,100	ND	120	ND	130	190	140	84	100	ND	790
S342	30	Twp Hwy 278	Meigs	12.7	9/18	39.10148	-81.772548	190918-S342-SL-01	4,300	ND	250	92	160	190	130	95	120	ND	830
S343	30	Little Forest Run Rd	Meigs	11.8	9/18	39.115591	-81.768744	190918-S343-SL-01	2,000	190	530	260	190	170	170	140	150	ND	540
S344	30	Twp Hwy 277	Meigs	12.2	9/18	39.111858	-81.778682	190918-S344-SL-01	7,000	ND	100	95	120	220	100	110	120	ND	580
S345	32	Twp Hwy 265	Meigs	11.8	9/18	39.121535	-81.785011	190918-S345-SL-01	21,000	290	770	350	650	650	200	130	130	42	440
S346	30	Durst Rd	Meigs	12.7	9/18	39.106043	-81.781569	190918-S346-SL-01	11,000	250	550	420	440	440	200	190	250	ND	1,000
S347	32	Twp Hwy 265	Meigs	12.9	9/18	39.115889	-81.812854	190918-S347-SL-01	4,100	480	750	400	500	280	340	300	330	ND	820
S348	32	Number Nine Rd	Meigs	12.8	9/18	39.117637	-81.810533	190918-S348-SL-01	1,000	140	220	93	93	79	120	100	150	ND	500

Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
S349	32	Twp Hwy 370	Meigs	12.0	9/18	39.132111	-81.810903	190918-S349-SL-01	1,400	320	290	170	140	120	140	130	180	ND	460
S351	32	Unnamed road off of Co Hwy 46	Meigs	13.1	9/18	39.115068	-81.816639	190918-S351-SL-01	1,300	720	460	170	160	110	220	290	490	ND	900
S352	32	Boston	Meigs	12.4	9/18	39.121738	-81.805866	190918-S352-SL-01	2,000	300	180	140	120	67	88	66	76	ND	ND
S353	32	Number Nine Rd	Meigs	12.4	9/18	39.12066	-81.805026	190918-S353-SL-01	1,600	120	450	170	160	110	110	86	150	ND	ND
S354	32	Co Hwy 46	Meigs	12.6	9/19	39.129641	-81.826169	190919-S354-SL-01	6,900	260	320	ND	290	320	97	ND	63	ND	ND
S355	32	Twp Hwy 370	Meigs	12.2	9/18	39.130122	-81.814092	190918-S355-SL-01	4,800	470	670	350	390	260	240	180	220	42	520
S357	30	Putnam Dr	Meigs	12.5	9/18	39.106702	-81.774881	190918-S357-SL-01	2,400	560	340	120	130	120	200	170	230	ND	760
S358	30	Twp Hwy 277	Meigs	12.2	9/18	39.11492	-81.782801	190918-S358-SL-01	7,100	660	580	230	320	270	260	250	310	37	570
S359	30	Durst Rd	Meigs	12.7	9/18	39.105542	-81.782815	190918-S359-SL-01	920	510	160	ND	62	78	110	130	200	ND	450
S361	32	Twp Hwy 265	Meigs	12.3	9/18	39.120651	-81.801685	190918-S361-SL-01	1,700	ND	100	ND	60	57	69	64	120	ND	510
S361	32	Twp Hwy 265	Meigs	12.3	9/18	39.120651	-81.801685	190918-S361-SL-02	2,000	ND	130	ND	72	61	74	86	130	ND	490
S362	30	Twp Hwy 270	Meigs	11.8	9/19	39.115622	-81.768653	190919-S362-SL-01	6,600	260	430	ND	380	320	84	49	ND	ND	ND
S363	32	Number Nine Rd	Meigs	12.2	9/18	39.119689	-81.793841	190918-S363-SL-01	9,000	780	500	230	370	270	220	160	200	29	740
S368	32	Twp Hwy 265	Meigs	12.4	9/17	39.118631	-81.798538	190917-S368-SL-01	1,500	ND	ND	ND	78	59	70	45	85	ND	440
S370	30	Riverview Trail	Meigs	14.0	9/16	39.086018	-81.783929	190916-S370-SL-01	7,800	310	510	210	320	260	160	130	190	ND	370
S371	30	Honeysuckle Self Guided Nature Trail	Meigs	13.3	9/16	39.092408	-81.773583	190916-S371-SL-01	920	300	250	100	130	67	79	58	76	ND	ND
S372	30	Riverview Trail	Meigs	14.0	9/16	39.086418	-81.784239	190916-S372-SL-01	12,000	770	610	270	600	460	260	170	160	ND	530
S373	30	Riverview Trail	Meigs	13.7	9/16	39.090831	-81.784325	190916-S373-SL-01	5,400	2500	640	490	210	240	350	330	470	49	710
S374	30	Riverview Trail	Meigs	13.6	9/16	39.09236	-81.783973	190916-S374-SL-01	7,700	310	520	240	400	340	160	160	150	69	780
S375	30	Curtis Hollow Rd	Meigs	13.2	9/16	39.091676	-81.766794	190916-S375-SL-01	980	310	340	120	100	97	130	180	250	ND	600
S376	30	Curtis Hollow Rd	Meigs	13.0	9/16	39.105186	-81.793555	190916-S376-SL-01	580	12,000	99	ND	ND	47	ND	42	75	ND	ND
S377	30	Curtis Hollow Rd	Meigs	13.0	9/16	39.102708	-81.787687	190916-S377-SL-01	570	570	340	ND	110	72	88	110	220	ND	740
S384	30	Forked Run South Entrance Road	Meigs	13.6	9/17	39.087405	-81.769793	190917-S384-SL-04	16,000	660	360	130	240	360	370	320	390	ND	610
S384	30	Forked Run South Entrance Road	Meigs	13.6	9/17	39.086907	-81.770049	190917-S384-SL-03	3,600	ND	410	160	250	180	170	94	110	ND	410



Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
S384	30	Forked Run South Entrance Road	Meigs	13.6	9/17	39.086613	-81.769216	190917-S384-SL-01	7,700	340	620	280	400	300	280	150	180	42	440
S384	30	Forked Run South Entrance Road	Meigs	13.6	9/17	39.086663	-81.769748	190917-S384-SL-02	6,900	ND	380	190	300	230	200	110	130	ND	450
S385	30	Forked Run South Entrance Road	Meigs	13.5	9/17	39.08838	-81.768898	190917-S385-SL-01	9,300	600	730	390	600	420	390	280	280	ND	660
S385	30	Forked Run South Entrance Road	Meigs	13.5	9/17	39.088463	-81.769368	190917-S385-SL-03	5,500	ND	440	170	270	220	290	170	190	ND	630
S385	30	Forked Run South Entrance Road	Meigs	13.5	9/17	39.088346	-81.769127	190917-S385-SL-02	4,400	ND	ND	ND	170	160	150	88	100	ND	320
S386	30	Forked Run South Entrance Road	Meigs	13.7	9/17	39.085938	-81.771685	190917-S386-SL-02	9,700	ND	400	260	380	310	210	110	120	39	550
S386	30	Forked Run South Entrance Road	Meigs	13.7	9/17	39.085836	-81.771506	190917-S386-SL-03	5,600	ND	320	150	230	180	220	120	130	ND	990
S386	30	Forked Run South Entrance Road	Meigs	13.7	9/17	39.085745	-81.771818	190917-S386-SL-01	9,700	490	140	ND	140	270	320	180	220	ND	830
S387	30	Forked Run South Entrance Road	Meigs	13.5	9/17	39.088775	-81.769665	190917-S387-SL-01	2,000	ND	110	ND	ND	55	ND	26	ND	ND	410
S387	30	Forked Run South Entrance Road	Meigs	13.5	9/17	39.088775	-81.769665	190917-S387-SL-02	2,400	ND	ND	ND	120	86	44	ND	ND	ND	270
S389	30	Forked Run South Beach Area	Meigs	13.3	9/17	39.091239	-81.769158	190917-S389-SL-01	6,300	ND	260	170	270	230	66	ND	ND	ND	ND
S390	49	Vista Point Trail	Athens	20.4	9/18	39.352692	-82.04077	190918-S390-SL-01	5,800	220	400	140	230	200	280	180	170	69	710
S391	49	Sundown Trail	Athens	20.0	9/18	39.351321	-82.034233	190918-S391-SL-01	1,500	170	210	98	120	100	170	110	130	ND	770
S391	49	Sundown Trail	Athens	20.0	9/18	39.351321	-82.034233	190918-S391-SL-02	1,500	ND	230	ND	100	100	180	89	120	ND	1,000
S392	49	Athens Trail	Athens	20.4	9/19	39.34222	-82.045	190919-S392-SL-01	6,600	140	470	ND	300	250	180	82	83	ND	ND
S392	49	Athens Trail	Athens	20.4	9/19	39.34222	-82.045	190919-S392-SL-02	7,000	140	510	ND	280	300	170	87	92	41	560

Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
S393	49	Rockhouse Trail	Athens	21.3	9/19	39.339518	-82.062041	190919-S393-SL-01	5,000	250	440	ND	230	120	220	110	91	28	790
S394	49	Hickory Multi-use Trail	Athens	20.5	9/19	39.34938	-82.043213	190919-S394-SL-01	5,800	150	230	ND	180	240	170	100	87	ND	600
S395	49	Hickory Multi-use Trail	Athens	20.1	9/19	39.346809	-82.036989	190919-S395-SL-01	6,600	ND	440	ND	330	250	150	69	74	ND	380
S396	41	Pete Smith Trail	Athens	19.5	9/17	39.359197	-82.02135	190917-S396-SL-01	7,400	ND	580	210	320	370	170	100	160	ND	1,800
S397	41	Sundown Trail	Athens	18.9	9/16	39.346089	-82.013402	190916-S397-SL-01	5,500	210	420	ND	350	260	130	95	68	35	400
S398	49	Thunderbunny Trail	Athens	20.9	9/17	39.359071	-82.048174	190917-S398-SL-01	5,900	ND	480	130	360	250	100	ND	54	37	1,000
S399	41	Sundown Trail	Athens	19.3	9/16	39.345134	-82.022305	190916-S399-SL-01	5,400	ND	360	160	290	200	130	51	60	56	420
S400	41	Sundown Trail	Athens	18.8	9/16	39.336756	-82.014321	190916-S400-SL-01	4,300	150	420	160	240	170	180	79	98	ND	410
S401	49	Scatter Ridge Trail	Athens	20.8	9/17	39.363415	-82.043637	190917-S401-SL-01	2,100	ND	ND	ND	80	81	200	150	170	ND	650
S402	41	Hickory Multi-use Trail	Athens	19.0	9/17	39.336844	-82.01959	190917-S402-SL-01	290	ND	92	ND	47	ND	ND	ND	ND	ND	710
S403	49	Beaver Pond Trail	Athens	21.5	9/17	39.371582	-82.054058	190917-S403-SL-01	3,600	ND	420	180	270	190	130	74	100	ND	920
S404	49	Athens Trail	Athens	21.5	9/19	39.345885	-82.064906	190919-S404-SL-01	3,800	170	640	ND	240	200	260	150	170	31	740
S405	49	Beaver Pond Trail	Athens	21.4	9/17	39.3702	-82.052231	190917-S405-SL-01	2,000	ND	280	99	150	100	89	34	70	ND	440
S406	49	Vista Point Trail	Athens	20.9	9/17	39.357956	-82.04767	190917-S406-SL-01	4,800	240	480	150	240	240	170	100	130	31	860
S407	41	Hickory Multi-use Trail	Athens	19.5	9/17	39.340611	-82.027911	190917-S407-SL-01	1,500	ND	230	ND	110	69	49	ND	45	ND	450
S408	41	Sundown Trail	Athens	19.0	9/16	39.346594	-82.016347	190916-S408-SL-01	4,800	120	370	130	240	170	140	77	98	ND	430
S409	41	Sundown Trail	Athens	19.3	9/16	39.342395	-82.023132	190916-S409-SL-01	3,600	ND	310	130	180	160	150	65	69	ND	380
S410	49	Beaver Pond Trail	Athens	21.2	9/17	39.367931	-82.049383	190917-S410-SL-01	2,300	ND	270	100	160	110	100	39	70	ND	260
S411	41	Lakeview Trail	Athens	18.9	9/16	39.340761	-82.016379	190916-S411-SL-01	1,600	16,000	210	110	170	160	ND	ND	ND	ND	ND
S412	49	Hollow Point Trail	Athens	20.5	9/17	39.361371	-82.038335	190917-S412-SL-01	3,200	ND	280	100	170	160	96	50	58	ND	1,100
S413	41	Sundown Trail	Athens	19.6	9/16	39.347515	-82.027295	190916-S413-SL-01	1,700	220	260	190	150	110	110	65	66	ND	310
S424	49	Strouds Run Rd	Athens	20.8	9/16	39.352715	-82.048537	190916-S424-SL-01	220	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

**Table A.1. PFOA, GenX, and other frequently detected PFAS results for shallow soil samples**

Site ID	Grid	Road	County	Distance from Facility (miles)	Sample date (2019)	Latitude	Longitude	Sample number	(ng/kg)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
S425	41	213A parking lot	Athens	18.9	9/16	39.335401	-82.016781	190916-S425-SL-02	2800	ND	300	170	290	160	ND	ND	ND	ND	550
S426	55	Co Rd 58	Morgan	28.3	9/16	39.570052	-82.036599	190916-S426-SL-01	7,500	ND	900	380	460	370	430	190	230	ND	970
S427	55	Sunday Creek Rd	Morgan	28.3	9/16	39.574392	-82.028559	190916-S427-SL-01	5,100	ND	670	320	390	340	280	110	140	ND	720
S428	55	Burr Oak Rd	Morgan	27.6	9/16	39.547485	-82.046533	190916-S428-SL-01	990	ND	190	ND	99	71	67	37	55	ND	400
S429	55	Leppert Dr	Morgan	26.4	9/16	39.523891	-82.043235	190916-S429-SL-01	5,000	ND	470	210	360	210	140	47	ND	ND	580
S430	55	Burr Oak Lodge Rd	Morgan	26.2	9/16	39.532422	-82.029529	190916-S430-SL-01	2,700	780	340	200	240	170	220	140	120	ND	760
S577	30	Putnam Dr	Meigs	13.1	9/18	39.094638	-81.76964	190918-S577-SL-01	4,700	360	630	250	300	200	240	310	420	ND	1,500
S578	32	Joppa Rd	Meigs	10.7	9/19	39.14849	-81.799696	190919-S578-SL-01	16,000	730	810	ND	590	580	440	260	280	37	700
S579	32	Number Nine Rd	Meigs	12.1	9/18	39.119104	-81.789261	190918-S579-SL-01	7,200	510	640	280	390	300	240	220	180	40	1,300
S580	32	Twp Hwy 370	Meigs	12.3	9/18	39.124557	-81.809092	190918-S580-SL-01	11,000	570	400	180	340	380	220	150	150	43	730
S584	30	Twp Hwy 278	Meigs	13.0	9/19	39.096758	-81.772303	190919-S584-SL-01	750	ND	ND	ND	ND	ND	ND	46	58	33	ND
S730	21	Twp Rd 268	Washington	5.4	9/18	39.345591	-81.651496	190918-S730-SL-01	5,500	350	1100	730	680	210	220	350	260	ND	450
S731	22	Lane Rd	Washington	5.7	9/18	39.352677	-81.678996	190918-S731-SL-01	7,600	660	450	160	210	100	500	500	370	ND	830



Table A.2. PFOA, GenX, and other frequently detected PFAS results for surface water samples

Site ID	Grid	Sampled waterbody	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Objective 1																			
R100	1	Little Hocking River	Washington	1.3	9/18	39.264774	-81.697918	190918-R100-SW-02	53	11	4.2	ND	4.3	1.9	0.98	0.44	ND	2.3	4.7
R101	2	Jordan Run	Athens	7.9	9/18	39.267289	-81.821759	190918-R101-SW-01	270	3.9	6.1	ND	5.6	6.5	0.36	ND	ND	0.79	1.9
R102	3	Green Run	Athens	12.4	9/18	39.26079	-81.90669	190918-R102-SW-01	37	ND	2.3	ND	1.4	1	0.36	ND	ND	ND	ND
R103	4	Middle Branch Shade River	Meigs	16.3	9/16	39.169882	-81.95101	191609-R103-SW-06	34	1.8	4.7	ND	1.7	1.2	0.63	ND	ND	ND	3.8
R104	5	West Branch Shade River	Meigs	23.5	9/16	39.169239	-82.093311	191609-R104-SW-05	27	3.1	6	ND	2.4	1.5	0.84	ND	ND	ND	2
R105	6	Goose Creek	Meigs	25.1	9/16	39.178413	-82.127126	191609-R105-SW-01	21	1.7	5	ND	2.1	1.2	0.68	0.29	ND	ND	3.3
R106	7	Malloons Creek	Meigs	33.2	9/17	39.038344	-82.216772	190917-R106-SW-01	32	2.7	11	3.4	3.7	1.9	0.57	ND	ND	0.88	1.2
R107	8	Pierce Run	Vinton	39.3	9/17	39.157801	-82.392396	190917-R107-SW-01	27	ND	5.9	ND	2.1	2.4	0.8	ND	ND	ND	1.3
R108	9	Davis Creek	Washington	2.0	9/17	39.277796	-81.639369	190917-R108-SW-01	53	18	4.2	4.5	4.7	2.4	3.8	0.82	ND	2.9	7.7
R109	11	Mill Branch	Washington	2.7	9/16	39.299696	-81.643205	190916-R109-SW-02	980	150	31	11	36	32	3.4	0.58	ND	3	7
R110	12	Little Hocking River	Washington	2.0	9/17	39.297992	-81.663274	190917-R110-SW-01	920	85	20	7.7	21	20	4.3	2.3	1.4	2.5	10
R111	13	Short Brook	Washington	2.5	9/16	39.304556	-81.685812	190916-R111-SW-02	900	43	32	13	29	23	4.3	1.3	ND	3	6.9
R112	15	Big Run	Washington	4.0	9/16	39.306232	-81.73248	190916-R112-SW-02	620	73	55	52	75	26	2.9	0.67	ND	2.6	4.8
R113	16	Sawyer Run	Washington	1.7	9/18	39.254353	-81.699465	190918-R113-SW-01	83	7.4	ND	ND	4.7	2.7	2	1.5	1.3	2.5	10
R114	17	Little Hocking River	Washington	2.0	9/18	39.276883	-81.711252	190918-R114-SW-01	330	36	11	5.1	9.7	7.7	2.2	1.3	2.1	2	19
R114	17	Little Hocking River	Washington	2.0	9/18	39.276883	-81.711252	190918-R114-SW-02	310	36	8.4	ND	9.8	9.2	1.9	1.2	1.7	1.7	6.9
R115	18	Congress Creek	Washington	5.3	9/17	39.28488	-81.578154	190917-R115-SW-01	440	210,000	36	ND	ND	27	ND	ND	ND	ND	ND
R116	20	Mill Branch	Washington	5.0	9/16	39.317439	-81.603593	190916-R116-SW-02	660	35	19	5.7	15	19	1.9	0.48	ND	3.2	2.2
R117	21	Tupper Creek	Washington	8.8	9/16	39.393873	-81.637313	190916-R117-SW-01	250	9.1	10	4.1	8.4	5.7	0.96	ND	ND	1.6	2
R118	22	South Fork South Branch Wolf Creek	Washington	9.3	9/16	39.402225	-81.705848	190916-R118-SW-01	180	11	20	5	6.1	2.6	3.3	0.68	ND	1.5	6.6
R119	23	Sugarcamp Run	Meigs	9.6	9/16	39.141561	-81.745835	191609-R119-SW-09	11	20	3.7	ND	3.1	1.2	0.64	0.4	ND	2.5	4
R120	24	Longs Run	Washington	5.4	9/16	39.316791	-81.755586	190916-R120-SW-01	260	8.7	11	3.4	8	5.2	1.3	ND	ND	0.87	2.9
R121	25	Hocking River	Athens	7.5	9/18	39.211426	-81.792153	190918-R121-SW-03	6.4	ND	7.5	3.8	5.3	1.3	0.53	ND	ND	2.8	ND
R122	26	Rowell Run	Athens	9.6	9/19	39.302403	-81.849981	190919-R122-SW-01	180	1.6	5.2	1.5	3.7	4.1	0.55	0.44	ND	ND	2.8
R123	27	Mile Run	Washington	12.6	9/19	39.405569	-81.517263	190919-R123-SW-01	140	ND	13	3.1	4.9	3.1	0.95	ND	ND	ND	6.5
R125	31	Laurel Run	Washington	13.8	9/16	39.424838	-81.838388	190916-R125-SW-01	130	12	15	3.2	5.1	3.8	0.71	ND	ND	1.1	2.5

Table A.2. PFOA, GenX, and other frequently detected PFAS results for surface water samples

Site ID	Grid	Sampled waterbody	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
R126	30	Guyan Run	Meigs	14.1	9/16	39.089742	-81.799969	191609-R126-SW-14	120	6.6	13	4.6	6.6	3.2	1.4	ND	ND	1.1	4.4
R127	31	Coal Run	Washington	13.8	9/16	39.424782	-81.838935	190916-R127-SW-01	67	1.4	5.3	1.3	2.5	1.9	0.64	0.37	ND	0.53	1.9
R128	32	Spicer Creek	Meigs	14.9	9/16	39.105405	-81.855947	191609-R128-SW-12	110	6.3	8.8	2.1	4	2.5	0.89	ND	ND	1	0.93
R129	33	Hocking River	Athens	11.8	9/19	39.307948	-81.889619	190919-R129-SW-01	3.6	ND	8.9	5	6.9	1.1	0.48	ND	ND	3.1	2.3
R130	34	Sheets Run	Washington	18.8	9/19	39.362363	-81.34504	190919-R130-SW-01	72	5.4	10	2	3.6	1.8	0.68	0.28	ND	2.4	8.7
R131	35	Second Creek	Washington	17.1	9/19	39.452083	-81.458977	190919-R131-SW-01	19	ND	6.3	3.8	3.8	1.6	0.69	ND	ND	5.1	6.3
R132	36	West Branch Wolf Creek	Washington	18.0	9/16	39.52985	-81.654107	190916-R132-SW-01	180	12	12	ND	6.9	5.6	1.4	0.5	ND	1.8	8
R133	37	Mill Run	Morgan	18.8	9/19	39.536543	-81.749937	190919-R133-SW-01	38	ND	3.3	0.65	0.94	0.84	ND	ND	ND	0.68	ND
R134	38	DeWitt Run	Meigs	16.8	9/16	39.048244	-81.804687	191609-R134-SW-16	13	17	3.7	3.3	3.2	1.5	0.63	0.47	ND	2.9	3.7
R135	39	Shrader Run	Washington	15.4	9/16	39.462429	-81.820998	190916-R135-SW-01	89	2.1	9.2	2.5	5.6	2.6	0.32	ND	ND	0.87	ND
R136	40	Shade River	Meigs	18.4	9/17	39.087482	-81.925244	190917-R136-SW-01	33	ND	4.1	ND	1.6	1.2	0.61	ND	ND	ND	2.9
R137	41	McDougall Branch	Athens	18.6	9/18	39.382273	-81.991761	190918-R137-SW-01	210	ND	63	14	14	9	6	ND	ND	ND	ND
R138	42	Newell Run	Washington	23.7	9/19	39.402938	-81.267791	190919-R138-SW-01	20	2.7	1.8	0.48	0.84	0.71	ND	ND	ND	ND	1.3
R139	43	Moss Run	Washington	23.9	9/19	39.473873	-81.314599	190919-R139-SW-01	32	ND	2.8	ND	1.5	1.3	0.29	ND	ND	1.4	3.1
R140	44	Big Run	Washington	20.6	9/19	39.554173	-81.554497	190919-R140-SW-01	15	ND	4	3.6	3.6	1.3	0.6	ND	ND	4.4	5.8
R141	45	Perry Run	Morgan	23.1	9/19	39.603115	-81.716018	190919-R141-SW-01	27	ND	6.6	1.3	1.7	1	0.3	ND	ND	0.76	ND
R143	57	Hyde Fork	Athens	26.0	9/18	39.449332	-82.102127	190918-R143-SW-01	46	ND	14	2	3.8	1.6	0.71	ND	ND	1.7	ND
R144	48	Kerr Run	Meigs	23.1	9/17	39.041139	-81.989026	190917-R144-SW-01	24	ND	3.8	ND	1.7	1	0.53	0.55	ND	0.76	8.7
R146	50	Kesselring Run	Washington	25.9	9/19	39.423904	-81.234085	190919-R146-SW-01	33	ND	3.8	2	2.7	2	1.3	0.78	ND	0.75	30
R147	51	Middle Fork Duck Creek	Noble	29.7	9/18	39.622274	-81.355926	190918-R147-SW-01	18	ND	4	ND	1.2	0.75	ND	ND	ND	0.47	ND
R148	52	West Fork Duck Creek	Washington	27.2	9/18	39.614827	-81.428338	190918-R148-SW-01	22	ND	5.9	3.3	3.1	1.4	2.2	ND	ND	1.6	3
R149	53	Bear Run	Morgan	29.6	9/19	39.692209	-81.771358	190919-R149-SW-01	8.6	ND	3.4	ND	0.64	0.49	ND	ND	ND	0.42	ND
R150	54	Cooks Run	Meigs	25.6	9/17	38.923208	-81.847287	190917-R150-SW-01	26	ND	4.6	ND	1.5	1.3	0.66	0.31	ND	ND	2.4
R151	55	Sunday Creek	Athens	26.1	9/18	39.459644	-82.096072	190918-R151-SW-01	4.5	ND	2.2	ND	1.9	0.98	0.49	ND	ND	ND	2.2
R152	56	Hysell Run	Meigs	28.1	9/17	39.029341	-82.097366	190917-R152-SW-01	16	2.7	2.4	0.76	1.4	0.81	0.39	ND	ND	1.3	5.2
R154	58	Sheets Run	Washington	31.4	9/19	39.448513	-81.13461	190919-R154-SW-01	16	ND	4.5	1.4	1.8	0.92	0.35	ND	ND	0.96	2.5
R155	59	Indian Run	Monroe	34.5	9/18	39.629467	-81.225301	190918-R155-SW-01	13	ND	2.6	0.65	0.9	0.53	ND	ND	ND	ND	ND
R156	60	Sharon Fork	Noble	32.8	9/18	39.738858	-81.571611	190918-R156-SW-01	21	ND	5.6	0.78	1.1	0.72	0.27	ND	ND	ND	ND
R157	61	Mans Fork	Morgan	32.4	9/19	39.718979	-81.850856	190919-R157-SW-01	11	ND	6	ND	1.8	1.1	0.31	ND	ND	0.57	ND
R158	62	Brush Fork	Hocking	30.6	9/18	39.495701	-82.166837	190918-R158-SW-01	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
R159	63	Jessie Creek	Gallia	32.0	9/17	38.980284	-82.141427	190917-R159-SW-01	13	ND	2.6	ND	1.1	0.86	0.33	ND	ND	ND	1

Table A.2. PFOA, GenX, and other frequently detected PFAS results for surface water samples

Site ID	Grid	Sampled waterbody	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
R160	64	Rockcamp Creek	Athens	30.4	9/18	39.280839	-82.241195	190918-R160-SW-01	9.4	ND	ND	ND	1.6	0.69	0.39	0.31	ND	ND	5.2
R161	65	Creighton Run	Monroe	35.0	9/18	39.666255	-81.265505	190918-R161-SW-01	47	2.3	8.2	1.9	3	1.9	0.57	ND	ND	ND	2.4
R163	68	Dry Riffle Run	Muskingum	36.7	9/19	39.784397	-81.8542	190919-R163-SW-01	8.9	ND	3.6	0.63	0.7	0.61	ND	ND	ND	ND	ND
R164	69	Ogg Creek	Morgan	37.5	9/19	39.739493	-82.027789	190919-R164-SW-01	5	ND	2.2	0.87	ND	0.27	0.34	ND	ND	0.28	ND
R164	69	Ogg Creek	Morgan	37.5	9/19	39.739493	-82.027789	190919-R164-SW-02	4.8	ND	2.2	0.85	ND	0.31	0.33	ND	ND	0.3	ND
R165	70	Campaign Creek	Gallia	36.8	9/17	38.883127	-82.14601	190917-R165-SW-01	12	27	4.1	3.3	3.4	1.5	0.84	0.87	ND	3.4	9.7
R166	71	Little Sandy Run	Vinton	36.9	9/18	39.312665	-82.360741	190918-R166-SW-01	10	ND	ND	ND	ND	ND	0.72	ND	ND	ND	2.4
R167	7	Tedroe Run	Vinton	34.5	9/17	39.255446	-82.317876	190917-R167-SW-01	6.8	ND	1.8	ND	0.53	ND	ND	ND	ND	0.55	1.8
R168	8	Pierce Run	Vinton	39.2	9/17	39.165996	-82.392717	190917-R168-SW-01	4	ND	1.5	ND	ND	0.34	ND	ND	ND	ND	1.2
R169	8	Wheelabout Creek	Vinton	36.8	9/17	39.260561	-82.360571	190917-R169-SW-01	6.2	ND	1.7	ND	0.62	0.41	ND	ND	ND	ND	0.64
R170	37	Muskingum River	Morgan	20.0	9/19	39.54571	-81.788399	190919-R170-SW-01	4.8	ND	3.9	4.8	4.8	1.5	0.58	0.3	ND	8.1	ND
R171	47	West Branch Wolf Creek	Morgan	23.7	9/17	39.55524	-81.920998	190917-R171-SW-01	12	ND	4.2	ND	1.3	0.84	0.44	ND	ND	ND	3.1
R174	55	Mud Fork	Athens	29.6	9/18	39.516678	-82.126582	190918-R174-SW-01	47	ND	25	4.1	7	4.1	0.86	ND	ND	2.8	ND
R175	57	Fox Lake	Athens	28.0	9/18	39.297337	-82.196468	190918-R175-SW-01	9.7	ND	2.9	ND	1.3	0.75	0.42	ND	ND	ND	ND
R178	64	Hewett Fork	Athens	31.7	9/18	39.346672	-82.257565	190918-R178-SW-03	3.6	ND	1.3	ND	ND	0.32	ND	ND	ND	ND	ND
R178	64	Penrod Lake	Athens	31.7	9/18	39.345235	-82.257988	190918-R178-SW-01	5.4	ND	ND	ND	ND	0.64	0.44	ND	ND	ND	ND
R178	64	Penrod Lake	Athens	31.7	9/18	39.345235	-82.257988	190918-R178-SW-02	5.3	ND	ND	ND	ND	0.85	0.38	ND	ND	ND	ND
R179	67	Wolf Run Lake	Noble	36.8	9/18	39.793207	-81.542112	190918-R179-SW-01	16	1.5	ND	ND	1.2	1.3	0.37	ND	ND	0.35	ND
R180	68	Culter Lake	Muskingum	38.9	9/19	39.817561	-81.848954	190919-R180-SW-01	20	2.1	5.6	2.7	2.5	1.8	0.83	0.37	ND	ND	ND
R182	70	Robinson Run tributary	Gallia	40.0	9/17	38.966193	-82.309936	190917-R182-SW-01	11	ND	5.3	ND	1.5	1.1	0.78	ND	ND	3	3.8
R183	71	Raccoon Creek	Vinton	38.3	9/17	39.287562	-82.388444	190917-R183-SW-01	5	ND	2.2	ND	1.1	0.74	0.46	ND	ND	ND	7.4
R184	71	Lake Hope	Vinton	36.7	9/18	39.320362	-82.356238	190918-R184-SW-01	5.5	ND	ND	ND	0.71	ND	0.3	ND	ND	ND	2.5



Table A.2. PFOA, GenX, and other frequently detected PFAS results for surface water samples

Site ID	Grid	Sampled waterbody	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Objective 3																			
S313	12	Veto Lake	Washington	5.0	9/18	39.340789	-81.656472	190918-S313-SW-01	390	39	14	5.1	13	11	3.1	1.1	ND	1.5	ND
S314	21	Veto Lake	Washington	5.2	9/18	39.342829	-81.648573	190918-S314-SW-01	410	38	18	6.9	14	10	2.2	0.64	ND	1.5	ND
S315	21	Little Hocking River	Washington	5.4	9/18	39.345568	-81.646639	190918-S315-SW-01	380	29	14	ND	11	10	1.9	0.38	ND	1.6	ND
S316	21	Veto Lake	Washington	6.1	9/18	39.356344	-81.65455	190918-S316-SW-01	400	41	15	ND	12	13	2.4	0.87	ND	ND	ND
S317	21	Veto Lake	Washington	5.6	9/18	39.350496	-81.670342	190918-S317-SW-01	320	30	16	5.5	12	8	2.1	0.32	ND	1.6	ND
S318	22	Inlet to Veto Lake	Washington	5.6	9/18	39.350802	-81.677834	190918-S318-SW-01	510	23	24	12	24	14	1.8	ND	ND	ND	ND
S321	21	Veto Lake	Washington	6.2	9/18	39.358296	-81.655067	190918-S321-SW-05	390	33	15	6.7	13	11	2	1	ND	2.4	7.7
S329	3	Jordan Run tributary	Athens	10.7	9/17	39.235819	-81.868724	190917-S329-SW-01	300	ND	12	2.9	8.7	6.9	0.9	ND	ND	0.96	6.5
S330	55	Jordan Run tributary	Morgan	10.6	9/17	39.23865	-81.86924	190917-S330-SW-01	250	ND	3.4	1.1	3.3	6.4	0.5	ND	ND	0.64	1.8
S331	3	Jordan Run tributary	Athens	10.7	9/17	39.233612	-81.869736	190917-S331-SW-01	410	ND	5.6	6.6	6.2	9.8	1.2	ND	ND	1.1	8.5
S332	3	Jordan Run tributary	Athens	10.8	9/17	39.232624	-81.870909	190917-S332-SW-01	100	ND	1.2	ND	1.4	2.8	0.3	ND	ND	ND	2.2
S332	3	Jordan Run tributary	Athens	10.8	9/17	39.232624	-81.870909	190917-S332-SW-02	98	ND	1.2	ND	ND	2.7	0.27	ND	ND	ND	ND
S364	32	Forked Run	Meigs	12.4	9/18	39.119181	-81.799269	190918-S364-SW-01	130	4.6	6	1.4	3.6	3.2	0.93	ND	ND	0.85	2.1
S364	32	Forked Run	Meigs	12.4	9/18	39.119181	-81.799269	190918-S364-SW-02	150	5	6	1.2	3.4	2.7	0.91	ND	ND	0.81	2
S365	32	Forked Run tributary	Meigs	12.3	9/18	39.11925	-81.798252	190918-S365-SW-01	400	14	20	11	19	14	1.5	0.3	ND	1.3	1.4
S368	32	Forked Run tributary	Meigs	12.3	9/17	39.119278	-81.79836	190917-S368-SW-04	410	22	21	11	20	16	1.8	0.28	ND	1.3	2.1
S378	30	Forked Run Lake outfall	Meigs	13.3	9/16	39.09072	-81.767122	190916-S378-SW-01	76	3.5	7.2	1.2	2.6	1.9	0.45	ND	ND	ND	0.91
S379	30	Forked Run Lake	Meigs	13.2	9/16	39.093806	-81.768727	190916-S379-SW-01	140	6.8	3.9	1.5	2.8	3.7	0.81	0.33	ND	ND	1.3
S380	30	Forked Run Lake	Meigs	13.2	9/16	39.094472	-81.774742	190916-S380-SW-01	140	6.7	4	ND	2.8	4.3	0.75	ND	ND	ND	1
S381	30	Forked Run Lake	Meigs	13.0	9/16	39.10242	-81.786136	190916-S381-SW-01	140	6.6	4.4	ND	3.1	4.5	0.81	0.31	ND	ND	1.7
S411	41	Dow Lake	Athens	18.9	9/16	39.340716	-82.016468	190916-S411-SW-01	20	ND	2.1	0.98	1.1	1.1	0.47	0.53	ND	ND	ND

**Table A.2. PFOA, GenX, and other frequently detected PFAS results for surface water samples**

Site ID	Grid	Sampled waterbody	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
S414	41	Strouds Run (Dow Lake outfall)	Athens	18.9	9/16	39.33519	-82.017435	190916-S414-SW-01	23	ND	3.3	0.78	1.7	1.1	0.32	ND	ND	ND	ND
S416	41	Dow Lake inlet	Athens	19.4	9/16	39.347567	-82.022193	190916-S416-SW-01	63	ND	10	1.4	4.5	2.3	0.4	ND	ND	1.1	11
S417	49	Dow Lake	Athens	20.2	9/18	39.351542	-82.037671	190918-S417-SW-01	22	2	2.4	1	1.2	0.93	0.49	ND	ND	ND	ND
S418	49	Dow Lake	Athens	20.5	9/18	39.350742	-82.043593	190918-S418-SW-01	22	1.7	2.1	ND	1.3	0.98	0.45	ND	ND	ND	ND
S419	49	Dow Lake inlet	Athens	20.4	9/18	39.355099	-82.039532	190918-S419-SW-01	5.6	ND	1.7	ND	ND	ND	ND	ND	ND	0.69	ND
S420	49	Stouds Run (Dow Lake inlet)	Athens	20.8	9/18	39.352182	-82.04785	190918-S420-SW-01	44	ND	13	ND	3.7	1.6	0.56	ND	ND	1.4	ND
S431	55	Burr Oak Lake	Morgan	26.4	9/16	39.523842	-82.043513	190916-S431-SW-01	9.7	ND	2	ND	1	0.83	0.46	ND	ND	ND	1.7
S432	55	Burr Oak Lake	Morgan	26.6	9/16	39.535307	-82.036566	190916-S432-SW-01	9.5	ND	2.2	ND	ND	0.69	0.52	ND	ND	ND	5.3
S433	55	Burr Oak Lake	Morgan	27.0	9/16	39.551763	-82.025071	190916-S433-SW-01	11	ND	2.1	1	0.96	0.81	0.53	0.32	ND	ND	4

**Table A.3. PFOA, GenX, and other frequently detected PFAS results for drinking water samples**

Site ID	Grid	State land	County	Distance to Facility (miles)	Sample Date (2019)	Latitude	Longitude	Sample number	(ng/L)										
									PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
B100	30	Forked Run	Meigs	13.6	9/17	39.09255	-81.7838	190917-B100-DW-01	1.4	ND	3	ND	ND	ND	ND	ND	ND	ND	ND
B200	30	Forked Run	Meigs	13.4	9/17	39.09231	-81.7753	190917-B200-DW-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S300	68	Blue Rock State Park	Muskingum	38.9	9/19	39.81784	-81.8489	190919-S300-DW-01	2.9	2.6	3.1	0.47	ND	0.36	0.4	ND	ND	2.3	ND
S301	71	Lake Hope State Park	Vinton	36.7	9/18	39.3211	-82.3558	190918-S301-DW-01	2	ND	4.3	0.77	0.94	ND	0.53	ND	ND	1.7	0.87
S304	36	Muskingum River State Park Lock 4	Washington	19.2	9/16	39.54767	-81.643	190916-S304-DW-01	20	7.8	1.7	1	1.8	1.6	ND	ND	ND	3.6	ND
S307	67	Wolf Run State Park	Noble	36.7	9/18	39.79184	-81.5407	190918-S307-DW-01	4.3	1.9	3.6	0.82	1	ND	ND	ND	ND	ND	ND
S422	49	Strouds Run	Athens	20.2	9/18	39.35132	-82.0371	190918-S422-DW-01	1.8	ND	2.8	1	1.3	0.49	ND	ND	ND	1.3	ND
S422	49	Strouds Run	Athens	20.2	9/18	39.35132	-82.0371	190918-S422-DW-02	1.8	ND	2.7	0.99	1.2	0.57	ND	ND	ND	1.2	ND
S434	55	Burr Oak	Morgan	26.7	9/16	39.53751	-82.0348	190916-S434-DW-01	1.8	ND	3.1	1	1.4	0.65	ND	ND	ND	1.2	ND



**Table A.4. PFOA, GenX, and other frequently detected PFAS results for vertical soil profiles and groundwater (or adjacent surface water) samples**

State land	Site ID	County	Date (2019)	Distance from Facility (miles)	Latitude	Longitude	Sample ID	Soil lithology/ water type	Depth (ft)	Units	PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Veto Lake	S321	Washington	9/18	6.2	39.358247	-81.65515	190918-S321-SL-01	V	0.5	ng/kg	23,000	ND	220	140	430	820	41	25	ND	ND	ND
				6.2	39.358247	-81.65515	190918-S321-SL-02	V	5.5	ng/kg	2,300	ND	ND	ND	84	59	ND	ND	ND	ND	ND
				6.2	39.358247	-81.65515	190918-S321-SL-03	V	5.5	ng/kg	1,300	ND	ND	ND	50	48	ND	ND	ND	ND	ND
				6.2	39.358247	-81.65515	190918-S321-SL-04	V	11.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				6.2	39.358296	-81.655067	190918-S321-SW-05	SW	0	ng/L	390	33	15	6.7	13	11	2	1	ND	2.4	7.7
Veto Lake	S322	Washington	9/18	5.3	39.343485	-81.648969	190918-S322-SL-01	V	0.5	ng/kg	880	ND	ND	ND	52	ND	ND	ND	ND	ND	ND
				5.3	39.343485	-81.648969	190918-S322-SL-02	V	5.5	ng/kg	280	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5.3	39.343485	-81.648969	190918-S322-SL-03	V	11.5	ng/kg	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5.3	39.343485	-81.648969	190918-S322-SL-04	V	17.5	ng/kg	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5.3	39.343485	-81.648969	190918-S322-SL-05	S	27.5	ng/kg	210	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				5.3	39.343485	-81.648969	190918-S322-GW-06	GW	25-30	ng/L	410	15	12	5.5	14	9.7	1.2	ND	ND	0.88	1.1
Shade River	S368	Meigs	9/17	12.4	39.118631	-81.798538	190917-S368-SL-01	V	0.5	ng/kg	1,500	ND	ND	ND	78	59	70	45	85	ND	440
				12.4	39.118631	-81.798538	190917-S368-SL-02	V	5.5	ng/kg	2,700	ND	ND	ND	100	120	ND	ND	ND	ND	410
				12.4	39.118631	-81.798538	190917-S368-SL-03	V	9.5	ng/kg	1,900	ND	120	ND	78	83	ND	ND	ND	ND	ND
				12.3	39.119278	-81.79836	190917-S368-SW-04	SW	0	ng/L	410	22	21	11	20	16	1.8	0.28	ND	1.3	2.1

**Table A.4. PFOA, GenX, and other frequently detected PFAS results for vertical soil profiles and groundwater (or adjacent surface water) samples**

State land	Site ID	County	Date (2019)	Distance from Facility (miles)	Latitude	Longitude	Sample ID	Soil lithology/ water type	Depth (ft)	Units	PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Forked Run	S387	Meigs	9/17	13.5	39.088775	-81.769665	190917-S387-SL-01	V	0.5	ng/kg	2,000	ND	110	ND	ND	55	ND	26	ND	ND	410
				13.5	39.088775	-81.769665	190917-S387-SL-02	V	0.5	ng/kg	2,400	ND	ND	ND	120	86	44	ND	ND	ND	270
				13.5	39.088775	-81.769665	190917-S387-SL-03	V	6.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	460
				13.5	39.088775	-81.769665	190917-S387-SL-04	V	12.5	ng/kg	ND	ND	37	ND	ND	ND	ND	ND	ND	ND	ND
				13.5	39.088775	-81.769665	190917-S387-SL-05	S	22.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				13.5	39.088775	-81.769665	190917-S387-GW-06	GW	19.5–25	ng/L	ND	2.4	0.77	ND	ND	ND	ND	ND	ND	ND	ND
				13.5	39.088775	-81.769665	190917-S387-GW-07	GW	19.5–25	ng/L	ND	1.8	0.41	ND	ND	ND	ND	ND	ND	ND	ND
Forked Run	S389	Meigs	9/17	13.3	39.091239	-81.769158	190917-S389-SL-01	V	0.5	ng/kg	6,300	ND	260	170	270	230	66	ND	ND	ND	ND
				13.3	39.091239	-81.769158	190917-S389-SL-02	V	3.5	ng/kg	890	ND	ND	ND	ND	38	ND	ND	ND	ND	370
				13.3	39.091239	-81.769158	190917-S389-SL-03	V	7.5	ng/kg	440	ND	ND	ND	74	43	ND	ND	ND	ND	390
				13.3	39.091239	-81.769158	190917-S389-SL-04	S	12.5	ng/kg	260	ND	82	ND	ND	ND	ND	ND	ND	ND	590
				13.3	39.091239	-81.769158	190917-S389-GW-05	GW	10–20	ng/L	100	ND	17	2.2	4.9	3.4	2.3	1.7	ND	0.92	6.2
Strouds Run	S424	Athens	9/16	20.8	39.352715	-82.048537	190916-S424-SL-01	V	0.5	ng/kg	220	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				20.8	39.352715	-82.048537	190916-S424-SL-02	S	5.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				20.8	39.352715	-82.048537	190916-S424-SL-03	S	7.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				20.8	39.352715	-82.048537	190916-S424-SL-04	S	11.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				20.8	39.352715	-82.048537	190916-S424-GW-05	GW	9.5–15	ng/L	35	6.1	23	13	12	9	3.7	1.4	ND	9.5	12

**Table A.4. PFOA, GenX, and other frequently detected PFAS results for vertical soil profiles and groundwater (or adjacent surface water) samples**

State land	Site ID	County	Date (2019)	Distance from Facility (miles)	Latitude	Longitude	Sample ID	Soil lithology/ water type	Depth (ft)	Units	PFOA	GenX	PFBA	PFPeA	PFHxA	PFHpA	PFNA	PFDA	PFUnA	PFBS	PFOS
Strouds Run	S425	Athens	9/16	18.9	39.335401	-82.016781	190916-S425-SL-02	V	0.5	ng/kg	2,800	ND	300	170	290	160	ND	ND	ND	0	550
				18.9	39.335401	-82.016781	190916-S425-SL-03	V	4.5	ng/kg	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				18.9	39.335401	-82.016781	190916-S425-SL-04	V	7.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				18.9	39.335401	-82.016781	190916-S425-SL-05	S	11.5	ng/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
				18.9	39.335401	-82.016781	190916-S425-GW-06	GW	9.5–15	ng/L	18	ND	3.9	ND	2.1	0.88	0.71	0.74	1.3	ND	1.7

GW = groundwater, S = saturated zone, SW = surface water, V = vadose zone.